

# *UNESCO/IUBS/EUBIOS Bioethics Dictionary*

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We want global feedback on this draft of the dictionary, as a freely accessible on-line dictionary. It is accessible through the Internet site to download as a MS Word file from Eubios Ethics Institute web site:  
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Updates will be listed in a separate file with a list of undefined words. This is edition 1.3 and contains 600 more definitions to the 2002 edition. More of the following words will be defined, and further entries will be added. It is expected to then produce a hard copy, which will be distributed widely without profit. Please also note that the Dictionary is available on the *EubiosCD* , available from Eubios Ethics Institute, including 1500+ papers, reference materials and 19 books (US\$200). Eubios Ethics Institute <<http://eubios.info/index.htm>>

The suggested way to use the dictionary will be to download the file to your own computer. We hope that you will contribute to this global living dictionary project, so that we can better understand the terms we use. This dictionary is more than bioethics for biologists, or any other field, it is multidisciplinary and cross-cultural. Help us make it better!

This edition contains close to 4000 entries, and you can use it for your personal or educational use. It is copyrighted for commercial uses to Eubios Ethics Institute. We welcome additional words, and comments on existing entries. Please Email these to the editor in chief, Prof. Darryl Macer.

The responsibility for each entry rests with the authors, and it does not imply that these are the views of UNESCO, IUBS, Eubios Ethics Institute, or any other coauthor. Its origin comes from the members of the IUBS Bioethics Committee. We will be adding more words, including some description of influential bioethicists, in the future, we welcome your suggestions.

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## A

<a href="#">A</a>	<a href="#">B</a>	<a href="#">C</a>	<a href="#">D</a>	<a href="#">E</a>	<a href="#">F</a>	<a href="#">G</a>	<a href="#">H</a>	<a href="#">I</a>	<a href="#">J</a>	<a href="#">K</a>	<a href="#">L</a>	<a href="#">M</a>	<a href="#">N</a>	<a href="#">O</a>	<a href="#">P</a>	<a href="#">Q</a>	<a href="#">R</a>	<a href="#">S</a>	<a href="#">T</a>	<a href="#">U</a>	<a href="#">V</a>	<a href="#">W</a>	<a href="#">X</a>	<a href="#">Y</a>	<a href="#">Z</a>
<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**AAT** or alpha-1-antitrypsin: A protein which in deficiency causes a lung disease called emphysema, due to altered regulation of the enzyme. AAT can be produced through genetic technology in the milk of sheep, by transfer of the human gene to the sheep. One sheep made to produce AAT is called Tracy. (JA)

**ABM** : Anti-Ballistic Missile.

**ABNORMALITY** : Something that is not the normal. This term is used in the debate over fetal diagnosis in the selection of embryos or fetuses that have a trait that will cause disease. (See PRENATAL DIAGNOSIS). (DM)

**ABORIGINAL**. Original inhabitants of those parts of the world that were conquered and colonized with an overwhelming thrust aside of these populations to relatively isolated regions. These peoples are now called aboriginals, and are still found in many parts of the world: America (see AMERINDIAN), Australia (see AUSTRALIAN ABORIGINAL and Torres Straight Islander peoples), Guinea (Papuan), New Zealand (Maoris), etc. The natural admixture with the new settlers has been partially or totally absent, leaving a native community virtually untouched in biological and cultural terms. (See also AUSTRALIAN ABORIGINAL & INDIGENOUS) (GK)

**ABORTION**: The spontaneous or deliberate termination of pregnancy before the embryo or fetus has been born, or is viable outside the womb. Should be restricted to refer to the termination of a pregnancy after implantation of the embryo into the mother. Many countries have laws restricting access of mothers to abort their fetus. Some countries prohibit abortion outright, other countries allow for a range of conditions affecting the mother, and/or for fetal indications. Spontaneous abortions in the first trimester are due in 50% of the cases to chromosomal abnormalities (26% are due to trisomies, 10% to X monosomies, and the rest to triploidies, tetraploidies, or structural abnormalities). Moral issues have been extensively discussed for several millenium without resolution. (DM, FL, GK)

**ABORTION ON DEMAND** : Readily available legalized abortion, including abortion for personal or social reasons. (DM)

**ABORTION IN JUDAISM** : An extremely early Jewish source, the Mishna, (Tractate *Ohalot* not only allows abortion, but requires it when in cases when pregnancy threatens the life of the mother. The crucial issue according to the Mishna, is that "Her life is more important than its life." Among current authorities, there is no debate about the fact that abortion is sometimes permitted and required. The only debate is over the specific circumstances in which abortion would be indicated. The more strict, inspired by the writings of the late Rabbi Moshe Feinstein, allow for abortion only when the life of the mother is in clear and certain danger. More liberal orthodox rabbis, inspired by the views of Rabbi Eliezer Waldenberg, allow for abortion when the mother's life is in probable but not certain danger, when her health although not her life is in danger, when her mental although not her physical health is in danger, and even when the mother is a married woman who became pregnant because of an extra-marital relationship. (FL)

**ABSTRACT THOUGHT**: A general concept, as opposed to a thought about a particular individual. PLATO (q.v.) and his followers believed that while an imagination or memory about an individual object or person might contain palpable characteristics like colour, sound, taste, smell or tactile feeling, abstract thoughts are totally spiritual with no palpable content. But David HUME (q.v.) claimed that he had never experienced any such "spiritual and refined perceptions", and that all of his thoughts were really only particular images which might nonetheless be used in one's thinking to represent a large class of things. (In thinking about all dogs, for example, I might already have an image of a particular dog in my mind.)

Abstract thinking is really the same as thinking in generalizations, not thinking about "this particular cancer patient", for example, but thinking about "all (or most) cancer patients". Thinking in generalizations, or "epidemiologically", is a characteristic of Western conventional medicine. A new treatment is not accepted to replace an old one unless it works better in a "statistically significant" percentage of the tested population. Some Asian medical systems, like Ayurvedic and Chinese, are much more individualistic, and the doctor will prescribe a treatment only after observing many different characteristics of the individual patient. This makes it difficult to carry out conventional clinical trials on Asian medicine. Medical genetics, which is learning to spot genetically determined differences in patients' responses to drugs and environmental

influences, may however cause a "paradigm shift" and make scientific but individualized medicine possible. (FL)

**ABUSE:** (Latin *abuti* 'to waste'). 1. the intentional or unintentional misuse of substances, drugs, equipment, programs and so forth 2. to physically or verbally attack or maltreat another; for example, an abused person is an individual who has been harmed by another person or situation. (See CHILD ABUSE; DRUG ABUSE; ELDER ABUSE). (IP)

**ABUSE OF THE ELDERLY :** See ELDER ABUSE.

**ACCELERATING PACE OF CHANGE:** Technological innovation, computing power, information in scientific journals, global population, environmental change and many other aspects of modern life are undergoing rapid if not exponential increases. This rate of scientific and technological change is increasing human opportunity but also social and environmental risk. We have become used to this acceleration of history, as surprising technological advances become commonplace news items. However, many of these changes are driven by corporate motivations and are often already developed before their full ethical consequences can be properly debated. Each technological advance is progressive from the previous technologies, so there is a certain "spike" in the future beyond which prediction may be impossible. (See **TECHNOLOGY, MOORE'S LAW, FUTUROLOGY, CHANGE**) (MP)

**ACCEPTANCE :** See PUBLIC ACCEPTANCE.

**ACCIDENT :** Accidents are usually thought of as any events which were not intended. Some accidents, like auto accidents, are bad. Others, like accidentally finding a treasure trove of gold, are good accidents. Another kind of accident would be an event which unpredictable. By "unpredictable" is not meant "hard to predict", or "impossible to foresee given current knowledge or methods". What is meant is an event which even God, or someone with perfect knowledge of all preconditions and scientific laws, would not have been able to predict. Some people think that events of the kind which are studied in mathematical theories of chaos are accidental in this sense. But they are not, because chaotic systems are perfectly deterministic and predictable by means of mathematical functions. These functions are "non-linear", however. Whether or not an event is "accidental" is probably only a function of our ignorance. If we know the causes of an event, we say that it was determined. If we are ignorant of the causes, we call it "accidental".(FL)

**ACCOUNTABLE:** Emphasized liability for something of value either contractually or because of one's position of responsibility (see ACCOUNTABILITY, RESPONSIBLE) (IP)

**ACCOUNTABILITY :** Responsibility for explaining or justifying one's conduct to the public or to one's superiors. Social responsibility includes the obligations of an individual or institution to society. (see RESPONSIBLE) (DM)

**ACCURACY:** 1. correctness; 2. the extent to which a measurement is close to the actual value of a quantity being measured. Accuracy is the correctness of a measurement compared to the actually existing value or standard. In mathematics the accuracy of a number is expressed by its number of decimal places or of significant digits (e.g. 3.14 is accurate to 3 significant digits). (See PRECISION) (MP+RW)

**ACETYLCHOLINE (ACh)** : a major and widely distributed peripheral and brain neurotransmitter. ACh, first synthesized in 1867, is a cholinergic neurotransmitter with the primary function mediating synaptic activity of the nervous system and skeletal muscles. ACh is rapidly degraded by acetylcholinesterase (AChE) which prevents accumulation of the neurotransmitter. Naturally occurring ACh agonists include pilocarpine, muscarine (mushrooms) and arecoline (betel nuts). Symptoms of intoxication include salivation, nausea, vomiting, headache, visual disturbances, diarrhea, decreased heart rate and blood pressure, shock and possibly death. The best known antagonist is atropine but there is also scopolamine and related belladonna alkaloids, which are found in plants such as deadly nightshade. The ACh antagonists cause dryness of the mouth, increased heart rate, dilated pupils, difficulty swallowing, ataxia, restlessness, hallucinations and coma. A number of insecticides and nerve gases block AChE which results in elevated levels of ACh that can be fatal; hence the use of atropine to contract these effects. (See Brain Neurotransmitters; TOXICOLOGY; DOPAMINE; POISON HEMLOCK ). (SG2)

**ACF:** Australian Conservation Foundation.

**ACGT:** UK Advisory Committee on Genetic Testing, United Kingdom. Its terms of reference are (1) to provide advice to Ministers on developments in testing for genetic disorders; (2) to advise on testing individuals for genetic disorders taking account of ethical, social and scientific aspects; and (3) to establish requirements, especially in respect of efficacy and product information, to be met by manufacturers and suppliers of genetic tests. (JA)

**ACHIEVEMENT:** The successful completion of tasks, plans and responsibilities, or other accomplishments whether from inspiration, heroism or hard work. Achievements may be assigned by the self or motivated by a teacher, and the goals realized may be personal or professional. The achievements of people are commonly compared by society using age-related tests in school, and experience-related tests in the workplace. (MP)

**ACID** : 1. A compound that yields hydrogen ions ( $H^+$ ) when dissociated in solution, reacts with bases to form salts and tastes sour due to its low pH value 2. Street slang for the hallucinogenic mood-altering drug lysergic acid diethylamide (LSD), for example, "*to drop acid*" meaning to take LSD. (See ACID SOILS, LSD). (IP+MP)

**ACNFP** : Advisory Committee on Novel Foods and Processes of GM Food.

**ACQUIRED IMMUNODEFICIENCY SYNDROME** : see AIDS.

**ACT** : Advanced Cell Technology is a biotechnology organization and is located in Massachusetts in USA. (JA).

**ACT CONSEQUENTIALISM:** See UTILITARIANISM.

**ACT OF GOD** : See ACT OF NATURE.

**ACT OF NATURE** : a misadventure or casualty which is said to be caused by an 'Act of God'; that is, occasioned exclusively by forces of nature without the intervention of any human agency. An act of nature may be any accident produced by any physical force such as lightning strikes, tempests, perils of the seas, tornados, earthquakes etc. (See ACT OF PROVIDENCE). (IP)

**ACT OF PARLIAMENT** : a statute or law made by the sovereign with the advice and consent of those assembled in parliament. Acts of parliament form the written laws of the nation and are of three kinds: public, local or special, private or personal. The validity of a statute cannot be questioned in court. (IP)

**ACT OF PROVIDENCE** : an uncontrollable accident against which ordinary experience or foresight could not guard. (See ACT OF NATURE). (IP)

**ACT UTILITARIANISM**: See UTILITARIANISM.

**ACTIVE EUGENICS** See EUGENICS.

**ACTIVE EUTHANASIA**: See EUTHANASIA.

**ACTIVISM**: Self-initiated action and activity towards an ideological, political or environmental cause. Democratic countries encourage freedom of expression, and 'protest' may include petitions, public marches, civil disobedience and media attention. 'Direct action' is action outside the normal procedural system. There is opportunity for official activism from within charities, non-profit and non-government organizations. Workers' activism may include mass refusals to work - the strike or industrial action. Creatively attracting the media to an issue is one method used by social and environmental change destructive practices once exposed to the camera spotlight. Appropriating the power of media to a cause has been called 'culture jamming'. The internet has created a forum for uncontrolled discussion and organization of activism, as well as the online vandalism of 'hacktivism'. Sometimes activism undermines the cause and is sometimes branded 'ecoterrorism'. Quite the RESISTANCE, NATIVE PARADIGM) (MP)

**ACTIVITY ANOREXIA**: See ANOREXIA ATHLETICA.

**ACUPUNCTURE**: A Chinese traditional system of healing. This system treats various ailments by means of inserting small needles into the skin briefly at specific locations. These locations are known as "acupuncture points", and groups of these points are classed together in "meridians", of which there are twelve major ones. The system of acupuncture is popular in East Asia, and in recent decades has gained prominence in the West as well, as a method of controlling pain. The theory behind acupuncture is quite complex, involving the interaction of different organs with the Five Elements (see FIVE ELEMENTS) and with Yin and Yang (see YIN AND YANG). The central texts on acupuncture are written in classical Chinese, although some texts have been translated. (AG)

**ADA** : American Disability Act of 1990 which prohibits discrimination in the workplace against a handicapped person who is otherwise qualified. The act came into effect from 1992. (JA).

**ADA DEFICIENCY** : Adenosine deaminase deficiency is a rare genetic disease that is caused by lack of functional adenosine deaminase enzyme, that causes an immunodeficiency disease. In 1990 it was the target disease of the first attempts at human gene therapy, and has been one of the few genetic diseases claimed to be cured by gene therapy (2001). (See HUMAN GENE THERAPY) (DM)

**ADAM AND EVE** : See GENESIS and ORIGINAL SIN.

**ADAPT**: (*Latin: adaptâre 'to fit to'*) The adjustment of behaviour, form or function as a result of changes in the surrounding environment or

circumstances. For something to adapt, it must change or modify to suit a different purpose. Biology adapts during evolution, technology adapts to modernity, but most importantly for ethics, belief systems and human behaviours must adapt to suit an increasingly crowded and limited Earth. (See ADAPTATION, ADAPTIVE THINKING, ADAPTIVE MANAGEMENT, HUMAN EXTINCTION). (MP)

**ADAPTABILITY** : The ability to adjust with changes in circumstances is an important attribute for effective learning, personality development, planning, management, marketing, development and technological implementation. (See ADAPTIVE THINKING) (MP)

**ADAPTATION** : 1. in evolutionary biology a particular structure, physiological process or behavior that provides an organism with an advantage to better survive and reproduce; 2. the evolutionary process which leads to the development or modification of an existing structure or function in response to a changed environment; 3. the physiological response of sensory receptor organs (vision, touch, temperature, olfaction, audition and pain) to stimuli from the continually changing environment; 4. the conscious or unconscious modification of an individual adjusting to changing social and cultural surroundings. (IP)

**ADAPTIVE MANAGEMENT**: Adaptive management is handling, direction and control, which is responsive to changing circumstances. Ecological, sociopolitical and corporate management strategies are most effective when easily adapted and modified to accommodate changed environments, superior information or new motivations. This is a continuous dynamic process involving environmental and economic monitoring and assessment. Elements associated with adaptive management include: the collection and incorporation of new information, evidence-based management, adaptive modification of plans and strategies, the precautionary principle, strategic environmental assessment, environmental impact assessment, mitigation and contingency planning, taking opportunities rather than waiting for them, learning from the mistakes of others as well as your own, openness to innovation and responsiveness to critical input into the process. (See ADAPT, ADAPTIVE THINKING, STRATEGIC MANAGEMENT, PRECAUTIONARY PRINCIPLE) (MP)

**ADAPTIVE RADIATION** : The evolutionary divergence of a lineage of organisms into different phenotypes. (See RADIATION, EVOLUTION, NATURAL SELECTION) (MP)

**ADAPTIVE THINKING**: The ability to change one's mind on the basis of new certainty, is able to say 'I don't know', and is willing to revise beliefs and opinions. (See ADAPT, ADAPTATION, ADAPTIVE MANAGEMENT) (MP)

**ADD**: See ATTENTION DEFICIT HYPERACTIVITY DISORDER

**ADDICTION**: (Latin: *addicere* 'to devote') Compulsive, uncontrollable dependence on a substance, habit or practice to such a degree that cessation causes severe emotional and/or physical responses; however, the term is most often used in the context of drug addiction. Because drug addiction is a difficult concept to define, a WHO expert committee in 1970 substituted the words "drug dependence" which is characterized by psychological symptoms such as craving and a compulsion to take the drug on a continuous or periodic basis, with serious emotional and physical side-effects developing when the drug is withheld. The drugs of major concern (all causing physical and/or psychological symptoms of dependence) are alcohol, nicotine, the opiates, the sedatives particularly barbiturates, stimulants such as cocaine and the amphetamines, the hallucinogens like mescaline and lysergic acid diethylamide (LSD), and cannabis also known as marijuana, pot, dope or hashish. Although government concern centers primarily on illegal drug abuse such as heroin, the adverse effects of these is relatively small in comparison with the very large number of people dependent on alcohol and tobacco. Furthermore, few addicts confine their intake to a single substance, and synergistic interactions are often many times more hazardous than the additive effects would indicate. Dopamine is the messenger of the brain's reward systems and has been dubbed the courier of addiction because many paths of pleasure in the brain employ



dopamine messengers in their reinforcement. Mine in the brain and stimulate this reward system. For example, the "buzz" described by those taking amphetamines (better known as speed), or the "rush" of the sudden increase of brain dopamine activity that these drugs stimulate. Consequently, it is not entirely by accident that the ingenious human species hasts - often with pain and illness to themselves and their offspring as a result - of the natural intoxicants like alcohol, tobacco, opium and cocaine. Therefore responsibility and intelligent realism when it comes to caring for oneself, and if that fails judicious pharmacological intervention plus a program of self-education and prevention (Latin *addicere* to devote) (see FETAL ALCOHOL SYNDROME; DRUG TOLERANCE; INDIVIDUAL DRUG ENTRIES; INTERNET ADDICTION; GAMBLING ADDICTION). (IP)

**ADENINE** : Commonly abbreviated as A, one of four nitrogen containing bases in nucleotides, a component of DNA and RNA. (JA)

**ADENOSINE DEAMINASE DEFICIENCY**: See ADA DEFICIENCY.

**ADHD**: See ATTENTION DEFICIT HYPERACTIVITY DISORDER

**ADOLESCENCE**: the period between childhood and adulthood when, typically, dependence and immaturity are replaced by independence and maturity. In the USA it is the age designation for humans 13-18 years old. Adolescence is a time of emotional fluctuation and vulnerability due to the biological effects of rising sex hormone secretion and heightened libido. It may be a time of identity crisis, changing body image, experimentation with sex roles and sexuality (see PUBERTY). (IP, DM)

**ADOPTION** : The bringing of someone into a relationship that (s)he did not previously enjoy. Normally used to refer to the taking into a family of a baby or young person. Such adoptees generally have the legal privileges of natural daughters and sons. Refers to the integration of a child, born to another couple, into a family who decides to take care, educate and give love to this child. Law rules strictly the qualifications needed for adoption; usually, it is requested that the couple be composed by father and mother, but in some occasions, a single mother or father is also allowed to adopt. Third world countries bestow an elevated number of children for adoption to couples from wealthy countries. Usually, children for adoption have been previously abandoned or given to special institutions for this purpose. In most cases, these children are born to single women, whose economical situation does not allow them to raise a child, or are the outcome of rape. Unmarried pregnant young women in particular families are also sometimes forced by these to give their baby away for adoption. Since abortion is prohibited in most of these countries, they all have in the majority of cases no other way to solve the problem. Many hundreds of children around the world are adopted per year, but still many more remain in institutions awaiting for someone to give them a better life. In some countries, like Japan, adoption of older persons occurs. (MR+GK)

**ADRENAL GLANDS** : Paired organs situated on top of each kidney. Each adrenal gland is in fact two separate glands: a) the adrenal cortex (the outer portion) which synthesizes three principal classes of hormones - the glucocorticoids such as cortisol (implicated in stress physiology), the mineralocorticoids such as aldosterone (implicated in ionic balance of body fluids) and smaller amounts of sex hormones such as androgens and estrogens and b) the adrenal medulla (the inner portion) which consists of sympathetic neurons that secrete adrenaline and noradrenaline facilitating the alarm reaction of the General Adaptation Syndrome. (See ADRENALINE; GENERAL ADAPTATION SYNDROME; HOMEOSTASIS). (IP)

**ADRENALINE** : (Latin *ad* 'at' + *ren* 'kidney') Also known as epinephrine, is the 'fight-or-flight' hormone secreted by the adrenal medulla and affecting circulation, muscular action and general arousal. It also acts as a catecholamine neurotransmitter and provides the reaction sought after by the so called "adrenaline junkies". (See ADRENALINE JUNKIES; GENERAL ADAPTATION SYNDROME; ADRENAL



GLANDS). (IP+MP)

**ADRENALINE JUNKIE:** A person who habitually engages in risk-taking behavior such as extreme sports, due to a more than usual enjoyment in the associated releases of adrenaline or related hormones and neurotransmitters. (See ADRENALINE, JUNKIE) (MP)

**ADULTS :** Important for definition in relation to consent. Varies between countries. In the USA it is the age designation for humans 19-64 years old, with those 65 years and older being referred to as the aged. For bioethics purposes those persons 18 years and older are given legal competence in most countries. (See CONSENT). (DM).

**ADULTERY:** voluntary sexual intercourse between a married person and any other than the lawful spouse. In many countries adultery has been the principal ground for divorce and in earlier periods was even punishable by death, but despite legal and cultural prohibitions adultery has persisted throughout history. Various published surveys originating in the west have indicate that at least 50% of married men and women admit to having sexual intercourse after marriage with a person other than their spouse. From the biological perspective, the practice may represent a subconscious desire to outbreed and gain fitness by increased genetic diversity. (See SPERM COMPETITION, MARRIAGE, OPEN MARRIAGE, SWINGING, MISTRESS, CONCUBINE, COURTESAN, CUCKOLD, DIVORCE). (IP)

**ADVANCE DIRECTIVES :** Declarations by patients, made in advance of a situation in which they may be incompetent or unable to decide about their own care, stating their treatment preferences or authorizing a third party to make decisions for them. These include various documents including Durable power of attorney, Living wills, Psychiatric wills, Donor cards. (See also LIVING WILL, RIGHT TO DIE, EUTHANASIA). (DM+IP)

**ADVERSARIAL SYSTEM:** A system or process which relies on two or more opposing sides to resolve conflict and make decisions.

Adversarial government systems and legal process may engender conflict, bickering and 'zero-sum' bitter iterations and destructive criticism of theories are the backbone of progress in science. (See COLLABORATION, TEAMWORK, CONFLICT RESOLUTION, GAME THEORY) (MP)

**ADVERSE EFFECT :** a clinical or perceived undesired effect of a chemical or physical agent. (SG2)

**ADVISORY COMMITTEES :** Committees or commissions set up to advise governmental bodies or other institutions on public policy . (See also ETHICS COMMITTEES , REVIEW COMMITTEES). (DM)

**ADVISORY COMMITTEE ON GENETIC TESTING :** See ACGT (UK).

**AEROBE:** (Greek: *aer* 'air') Any microorganism that lives and grows on free oxygen (Greek: *aer* air + *bios* life). (See ANAEROBE). (IP)

**AEROBIC:** Pertaining to the presence of air or oxygen, or requiring oxygen for the maintenance of life (Greek *aer* air) (see AEROBIC EXERCISE, ANAEROBIC). (IP)

**AEROBIC EXERCISE :** any physical exercise which requires additional effort by the heart and lungs to meet the increased respiratory demand for oxygen. The activity is beneficial for all body components and it is significant to note that physical activity need not consist of an organized exercise program because simple pleasures, such as bush walking, gardening and other homely physical activities, also burn off excess calories which, if unused, turn to fat. Regular gentle aerobic exercise is important in pregnancy, however, since pregnancy requires a high degree of reflex coordination high impact sports needing a good sense of balance; such as water and snow skiing, diving, ice skating and

riding, should be avoided. (See ANAEROBIC EXERCISE). (IP)

**AEROBICS** : See AEROBIC EXERCISE.

**AEROSOLS**: are small particulates both natural and synthetic which are potentially of great importance climatically. The general trend suggests that they are increasing over the globe, particularly over industrial regions of the Northern Hemisphere where they reduce solar radiation reaching the surface of the Earth. The colloquial epithet "aerosol abuse" has been used to highlight harm caused from industrial aerosols by the environmentally irresponsible (see NUCLEAR WINTER). (IP)

**AESTHETICS** : The appreciation of beauty and appearance. (DM)

**AFFECT**: A transitive verb meaning to influence (act on, move, impress) to produce change in something (e.g. in a system, disease, person). To affect is to produce an effect. (See CAUSATION, EFFECT) (MP)

**AFFIRMATIVE ACTION**: The positive treatment of minority groups. Some say that positive discrimination is still discrimination, but affirmative action helps rebuild bridges of opportunity, and is a form of acknowledgement for past wrongs and the legacies of slavery, Colonialism and the dispossession of indigenous people. Examples of affirmative action include the Affirmative Action (Equal Employment Opportunity for Women) Act (Australia), Indigenous land management, educational privileges, healthcare assistance and social welfare assistance. (See MINORITY GROUPS, ACTIVISM) (MP)

**AFLOTOXINS**: Fungal toxins, Aspergillus flavus, of peanut, corn toxins have carcinogenic substances. (JA)

**AFRO-AMERICAN** : This term is used to designate the African descendants born in the United States of America. It has replaced the terms of "colored" or "black", which had a racist connotation. The word also vindicates the cultural relationship of these American descendants with the African cultures. Afro-American is also used in a broad sense to designate the Afro-descendants of all America, North, Central and South. (GK)

**AFRO-COLOMBIAN, AFRO-BRAZILIAN** : In those countries of South America, where a considerable part of the population descend from African immigrants, these people recognize themselves as Afro-Colombians or Afro-Brazilians. Many cultural traits have survived admixture and imposition of the dominant European culture. This is particularly true in music, dance, funerary rituals, marriage, extended families, etc. In Colombia, some of these groups have even maintained a Bantu related language, a pidgin language called "palenquero". (GK)

**AGAPE**: In the Greek language, three verbs can be used for the English word love, namely eros, phileo and agapao. These three verbs mean sensual love, brotherly love and self-giving love respectively. Agape love indicates the supreme and a nobler form of love, as seen in the sacrificial death of the Lord Jesus Christ on the cross for all human sin. Both Jews and Gentiles have a practice of fellowship and brotherhood means. The name agape can also indicate such fellowship meal. (JA)

**AGE** : Age factors are used when age is discussed as in relation to a subject or problem example, age of consent, or age related quality of life.

**AGE DISTRIBUTION**: The demography of the comparative ages of individuals in a population, commonly graphed as a 'population pyramid'. In developed countries with fewer children there is occurring a 'graying' of the population, whereas many less developed countries have the reverse, a 'youth bulge'. Age distrT, LIFE CYCLE) (MP)

**AGE OF CONSENT:** The age at which consenting sexual intercourse becomes legal, commonly at 16 years. More broadly, also the ages at which other rights of adults are conferred onto kids, such as driving, drinking alcohol and voting. (See **ADULTS, CONSENT**) (MP)

**AGE/SEX PYRAMID:** The Age/Sex Pyramid is a frequency distribution histogram displaying population composition according to age group (vertical scale) and gender (left/right), useful for illustrating age-specific birth, death, disease, fertility rates etc. (See **AGE DISTRIBUTION**) (MP)

**AGED :** In the USA this is the age designation for humans 65 years or older. Many persons in modern society live into advanced age, so the definition of 65 years or older may not be ethically relevant. Homes for the aged, pension schemes, senile dementia, and ageism (age-related discrimination in access to health care or other social services) are important issues. (See **QUALITY OF LIFE**). (DM)

**AGENDA 21:** An environmental, social and economic action plan for the 21<sup>st</sup> Century based upon principles of sustainable development. Agenda 21 was arranged and approved by many countries during the Rio de Janeiro United Nations Conference on Environment and Development (UNCED 1992). Although it suffers from negotiated compromise and is not legally binding, it is nevertheless an ambitious first international attempt to reconcile development and environment issues. (See **EARTH SUMMIT, CONVENTION OF BIOLOGICAL DIVERSITY, SUSTAINABLE DEVELOPMENT**). (MP)

**AGENT ORANGE :** the U.S. military code name of a mixture of herbicides used as a defoliant agent in Southeast Asia to deny communist soldiers jungle cover during the 1960s war in Vietnam. It is claimed that exposure to this agent is a cause of generations of birth defects and other inherited ailments including cancer, neuropathy and a variety of chronic diseases, however, confirmation of any such linkage would take decades of further research; thus, compensation demands from Hanoi and U.S. veterans are easily dismissed. Spraying was halted in 1971 when it was discovered that Agent Orange was contaminated with the highly toxic chemical dioxin, which is capable of harming human and animal health and has well-established multigenerational adverse health effects. Despite uncertainty as to the long-term effects of the wartime defoliant, there is the view that Washington and Agent Orange manufacturers, Dow Chemical Co. and Monsanto Co., have a moral duty to compensate Vietnamese who have suffered from exposure. (See **VIETNAM WAR, DIOXIN**). (IP)

**AGGRESSION:** Hostile or malicious actions or behavior; the act of violating by force the rights of another individual or group, including territorial rights. Aggressive behavior may have a genetic component, however it is likely to be predominantly a learned response in humans, precipitated by environmental variables such as periods of stress. Males have a higher incidence of fighting, crime, verbal aggression and fantasy aggression, although females will aggressively protect their young. Human aggression can be reduced by a nurturing environment of social responsibility from a young age. (see **AGGRESSOR NATION, DESENSITIZATION, VIOLENT MEDIA, WARFARE**). (MP)

**AGGRESSOR NATION:** The nation state which attacks, initiates or first declares a situation of warfare with another nation. Although it may sometimes be difficult, due to historical and social circumstances or wartime propaganda, the decisive determination of who was the aggressor nation can be a useful step in ethical conflict resolution, mediation and peace enforcement. (See **INSTITUTION OF WAR, PEACE ENFORCEMENT**) (MP)

**AGRICULTURE** Cultivation of crops and domestication of farm animals. Seems to have happened independently around 10 000 to 8000 BCE in the Middle East, the Orient and the Americas. Involves four processes: (1) Breeding of animals or sowing of seeds; (2) Caring for the animals or plants; (3) Collecting produce (e.g. harvesting, milking, slaughtering); (4) Selecting and keeping back some of the produce for the

next generation. (MR)

**AGING** : A natural biological process beginning soon after birth, and ending with death. In most ancient cultures, youngsters honored aged persons, seen as experienced, wise people. Still sometimes in aboriginal groups, one of the old men or women is chosen as the shaman, and given the religious, medical and political leadership of the whole community. Today, aging is seen in western countries as a fatal issue of life, and many hope that, with ongoing progress of biomedical sciences, its happening will be thrown back many years. Also, due to better life conditions and health care programs, people get older than decades before. In both cases, a high input of money and human endeavor is needed to give aging people an adequate life quality. Ethical considerations must balance the justification of these efforts face to other more poignant problems of humanity, as is famine, misery, war mutilations, basic health care, etc. (GK)

**AGNOSTIC**: (Greek: *agnostos* 'unknown') Holding the belief that because nothing is known about the existence of God there is the need to keeps an open mind beyond physical/ biological phenomena. The Victorian biologist and philosopher T.H. Huxley coined the term stating that in his opinion the laws of Nature could quite satisfactorily explain all natural phenomena and could not find a logical need for the existence of God. [Greek *agnostos* unknown] (IP)

**AGRICULTURAL ETHICS** : The study of the ethical issues associated by agriculture, aquaculture and fishing. May also include forestry in common discussions, e.g. the Ethics in Food and Agriculture program on FAO ([www.fao.org](http://www.fao.org)). There are numerous topics discussed in the use of agriculture, and some are reflected in documents relating to agriculture, including the debates over the use of animals, the concept of quality of life for animals, the concept of Maximum Sustainable Yield in fishing, the Land Charter, Peasant's Charter, the Pesticide Convention, and access to, and conservation of, genetic resources, for example. (DM)

**AGRICULTURE** : The planned cultivation and/or nurture of living organisms to provide food or other products, e.g. wool, cotton. Often also called farming. Origins are unsure, but commonly considered to be seen in the past ten thousand years of human culture. There are possible signs of agriculture in humans over the past hundred thousand years. Some agriculture is seen in other species as well, at much earlier points in history. (DM)

**AGROBACTERIUM**: (Agro = soil) *Agrobacterium tumefaciens* a common soil bacteria that can naturally carry genetic information (DNA) into plant cells by infecting wound sites on plant stems (JA)

**AGRO-BIOTECHNOLOGY**: The application of biotechnology to agriculture, such as the use of modern recombinant DNA technology in plant breeding programs to increase crop yield or disease resistance. In addition to creating genetically modified novel crop varieties, agro-biotechnology is also used by conservationists to maintain a viable global supply of germ plasm in order to safeguard future genetic diversity and a continuing crop inventory. (see AGROTECHNOLOGY, GENETIC ENGINEERING) (MP & IP)

**AGROFORESTRY**: (Agronomy + Forestry) A farming practice which integrates timber plantation with agricultural production on the same area of land. The combination of trees with crops not only provides a diversification of produce, but also provides habitat and protection from soil erosion and salinity. (See **PERMACULTURE**, **TREE PLANTING**). (MP)

**AGRONOMICS**: The economics of agronomy, for example the productivity of cultivation practices or the trade and distribution of agricultural products. (MP)

**AGRONOMY**: The science of agricultural cultivation, land and soil management, and the production of crops. (See **AGRICULTURE**) (MP)

**AGROTECHNOLOGY**: (Agronomy + technology) The application of science-based technology to agricultural production; the technological

means by which humans exploit farm ecosystems, artificially eliminating natural species competition and manipulating the system to increase its yield of products of high value to humans. Examples include modern agricultural equipment such as hydroponics, agri-business such as large government-financed breeding programs, and agro-biotechnology such as genetically modified crops. (See AGRO-BIOTECHNOLOGY, AGRICULTURE). (IP & MP)

**AHIMSA:** The South Asian cultural ideal of being non violent. Mahatma Gandhi used the principle of non violence in his struggle for freedom from foreign occupation of India. (JA)

**AI:** See ARTIFICIAL INSEMINATION or ARTIFICIAL INTELLIGENCE.

**AID:** Artificial insemination using donor sperm (see ARTIFICIAL INSEMINATION).

**AIDS:** acronym for Acquired Immunodeficiency Syndrome - the clinical end stage of human immunodeficiency virus (HIV) infection which results in severe, irreversible immune suppression. After sufficient immune system damage has occurred, the individual becomes susceptible to infection by many opportunistic diseases including cancers. These opportunistic diseases then become the indirect markers of AIDS; thus, AIDS is a syndrome or collection of many diseases resulting from HIV infection. The conditions was first noticed by doctors in the 1970s and formally described under the name acquired immune deficiency state in 1980. At first AIDS was identified as principally affecting two groups: drug users who shared needles and male homosexuals but now it's principally spread by the heterosexual community and bisexual males, and can be passed through the placenta and breast milk to the children of thosets and kills CD4+ lymphocytes (T helper cells) weakening the immune system's ability to fight infection. HIV may also invade macrophages and brain cecourse, semen and contaminated blood. All semen donors are initially testeill within the incubation period), before the donor product may be used in any IVF clinic.

A patient may be diagnosed as having AIDS if infected with HIV virus and a CD4+ count below 200-500 cells per milliliter of blood. Low cell count is usually accompanied by symptoms of extreme fatigue, intermittent fever, night sweats, chills, lymphadenopathy, enlarged spleen, severe diarrhea and weight loss, apathy and depression. Treatment consists primarily of combined chemotherapy, such as the antiviral drug AZT, to counteract the opportunistic infections but no cure has yet been found. Public awareness and sex education, particularly of adolescents, must remain a high priority. (See SYPHILIS). (DM+IP)

**AIDS SERODIAGNOSIS :** Immunologic tests for the identification of HIV (HTLV-III/LAV) antibodies; includes assays for HIVseropositivity and seronegativity which have been developed for detecting persons carrying the viral antibody. (DM+)

**AIH:** See ARTIFICIAL INSEMINATION BY HUSBAND.

**AIR POLLUTION :** Gases, liquids and solids which, when added to the normal composition of the atmosphere, may be hazardous to biology, ecology or human health. Processes leading to pollution of the atmosphere include attrition, vaporization and combustion. Types and sources of air pollution include photochemical smog, transportation exhausts, incinerator emissions, forest fire smoke, industrial discharges, greenhouse gases (carbon dioxide, nitrous oxides, CFCs etc.), suspended particulates, oxides of carbon and sulfur, inorganic and organic acids, toxic chemicals, trace elements, irritants and odors. Grit is sharp particulate matter such as dust which may cause skin and eye irritation. Grime is accumulated soot or dirt which adheres to a person or cityscape. Airborne particles may adsorb corrosive chemicals leading to the erosion of infrastructure and monuments. Air pollution epidemics are a recurring health problem in many major urban centers. Monitoring and regulation are beginning to improve in the developed world, with air pollution meteorology and models becoming more common in weather forecasts. Emissions may be controlled or reduced by absorption, adsorption, mechanical collection, air pollutant incineration, catalytic conversion,



electrostatic precipitation, fabric filters, wet collectors, mechanical cyclones, smokestack scrubbers and other pollution control devices - often legally regulated but also self-initiated by visionary companies. (See POLLUTION, WATER POLLUTION, ATMOSPHERE, GREENHOUSE GASES, ACID RAIN) (MP)

**AKIDO vs UESHIBA, MORIHEI:** A Japanese martial art, based on ancient tradition derived from the Samurai. But while Japanese martial arts formerly combined both violent and peaceful aspects, Aikido is one of those arts which, after World War II, has been emphasizing the peaceful, seeing martial techniques as ways of discouraging a violent attacker without hurting him or her seriously, eventually leading to love and peace. It is for these reasons that martial arts can be important to bioethics. (FL)

**ALCOHOL:** (Arabic: *alkohl* 'subtle essence') A clear water miscible organic substance obtained by fermentation with one or more hydroxyl (OH<sup>-</sup>) groups; but in common parlance refers to the ethyl alcohol or spirit contained in any beverage such as wine or liquor. [Arab *alkohl* subtle essence] (see ALCOHOLISM; ETHYL ALCOHOL ; FETAL ALCOHOL SYNDROME). (IP)

**ALCOHOLISM:** severe dependency on alcohol intake associated with cumulative destructive physical, reproductive and behavioral effects. The most serious medical consequences are central nervous system deterioration, liver cirrhosis and adverse reproductive effects. Alcohol abuse is the overuse of alcohol to the extent of habituation, dependence, or addiction (see ALCOHOLICS ANONYMOUS (AA); FETAL ALCOHOL SYNDROME). (IP, DM)

**ALCOHOLICS ANONYMOUS (AA):** an international nonprofit organization, founded in 1935, made up of members whose purpose is to stay sober and help others to recover from the disease of alcoholism. The AA program guides members through a 12-step plan aimed at overcoming alcohol addiction through abstinence, group support, shared experiences and faith. (IP)

**ALDRIN :** A dangerous chlorinated hydrocarbon pesticide, one of the 'dirty dozen' persistent organic pollutants. (See PERSISTENT ORGANIC POLLUTANTS) (MP)

**ALEXITHYMIA:** lack of emotionality or an inability to consciously experience and communicate feelings (see AXIODRAMA, EMOTIONAL INTELLIGENCE). (IP)

**ALGAE:** (Latin: *alga* "seaweed") A wide diversity of chiefly aquatic organisms comprising the seaweeds and various freshwater forms varying in appearance and size from single celled phytoplankton to multicellular macroalgae such as kelps. They are the Earth's dominant autotrophs supplying 50-60% of all photosynthesis on Earth (see AUTOTROPH, LICHENS). (MP & IP)

**ALGAL BLOOM:** A suffocating build-up of rapidly multiplying algae and bacteria, occurring in phosphorus enriched waterways caused by run-off sewage, fertilizers and the processes of eutrophication. The resulting increased biological activity transforms the water-mass green or red with large-scale decomposition rendering the habitat malodorous and toxic. Since all available oxygen is utilized by the bloom, anaerobic organisms begin to dominate the sediments, killing most of the animals from the previously viable aquatic habitat (see EUTROPHICATION & FISH KILLS). (MP & IP)

**ALGEBRA :** the branch of mathematics in which symbols (e.g.  $x, y, z$ ) are used to represent numbers or variables in arithmetic operations. (See ARITHMETIC). (IP)

**AL-GHAZALI:** (1058-1111)- Muslim scholar, theologian and Sufi, author of "Ihya Ulum al-Din" ("Revivification of the Religious Sciences"). In his major work, "Ihya Ulum al-Din", Al-Ghazali explains and clarifies in four parts, the foundation of the beliefs of Islam, and the path of the Sufi. The first part deals with basic principles, the concept of worship in Islam and the importance of study and seeking



knowledge. The second part deals with many matters of ethics. The third section deals with the evil traits that should be avoided, as they are an obstacle to approaching God. The fourth section deals with the stages of spiritual purification that are needed in order to attain salvation. (AG)

**ALGORITHM:** A set of steps or instructions which precisely describe a limited procedure or task. Computer programs are written in programming languages designed around the requirements for precision and coordination of sets of algorithms. (See COMPUTER, ARTIFICIAL LANGUAGES, GENETIC ALGORITHM) (MP)

**ALIEN LIFE:** It is certainly possible, perhaps probable, that life is common across the universe. Readings from distant sources in the galaxy have detected some chemical constituents of chlorophyll and amino acids. One serious scientific theory proposes that ice from impacting comets may have delivered the first building blocks of life to Earth. Solar systems with planets similar to our own are relatively common, estimated conservatively by Harvard University's Harlow Shapley at more than one hundred million fcts for life in our solar system are on Europa, oneeport flying saucers and alien abductions. Scientifent life cannot be found because it quickly tends to destroy itself with its own technology. (See LIFE, SETI, ORIGIN OF LIFE) (MP)

**ALIENS :** Beings from another planet. Ethical issues relating to the human attitude to aliens has been extensively discussed in science fiction literature. The term is also used in Japan and the USA to refer to foreigners. (DM)

**ALLAH :** Allah is special name for God in Arabic. In Islamic belief, Allah alone is the true God for all that exists who has no partners or rivals. The Quran mentions 100 names for God, which in deed they are adjectives and each one expresses one of His attributes. Allah is not a descriptive name like other ninety nine names and attributes such as The Merciful, The Beneficent. The name Allah, itself contains all these attributes. There is no consensus that the word Allah is compounded of "al" the definite article and "ilah", meaning "a god". The Qur'an mentions the word "Allah" have also been used in pre-Islamic times. This word is used by all Arabic speaking, Muslims, Christians Jews and others. (See QURAN) (AB).

**ALLELES:** Alternative forms of a genetic locus; alleles are inherited separately from each parent (e.g. at a locus for eye color there might be alleles resulting in blue or brown eyes). (DM) Alleles arise through mutations in a given DNA sequence. If the locus codes for a protein, alleles can result in different phenotypes. Alleles can be dominant (a single dose is sufficient for expression of the phenotype) or recessive (both genes must carry a mutant allele in order to express the trait). At the genotype level, the alleles at a given locus are co-dominant. Different alleles can also be found in silent regions of the genome (the non-coding part of the genome) (see STR, VNTR, SNP, RFLP). Some loci are bi-allelic, having only two alternative forms, but the most useful loci for gene mapping, population studies and human identification analyses are those which are multiallelic, resulting in a high polymorphism content of the locus at the population level. (GK)

**ALLOCATION OF RESOURCES :** See RESOURCE ALLOCATION.

**ALLOCATION RIGHTS :** See QUOTA.

**ALLOGRAFT :** (Greek *allos* "other" + *graphion* "stylus") also called homograft, a non-permanent graft of tissue between two genetically different individuals of the same species such as a tissues transplant between two individuals who are not identical twins. The graft material

can include, for example, cadaver skin stored in a tissue-bank. (See AUTOGRAFT, XENOGRAFT). (IP)

**ALLOPATRIC SPECIATION** : Evolutionary divergence of populations which forms different species due to geographic separation, which do not interbreed. (JA)

**ALLOPATRY**: (Greek: *allo* "other" and Latin: *patria* "homeland"). Occupying different geographic distributions or ranges. (See ALLOPATRIC SPECIATION, SYMPATRY) (MP)

**ALLOSTASIS**: (Greek: *allo* 'variable' + *stasis* 'stability') literally 'achieving stability through change' describes the mechanisms which enable the body to withstand challenge. Allostatic systems, particularly the nervous, hormonal and immune complexes, protect the body by adapting to the ever-changing internal and external demands made on it. Allostatic load refers to the price of adaptation; that is, the accumulated wear and tear from chronic over- or underactivity of the allostatic systems (see STRESS, HOPE and WELLBEING). (IP)

**ALLOWABLE CATCH** : See TOTAL ALLOWABLE CATCH.

**ALLOWING TO DIE**: The withdrawal or withholding of life-prolonging treatment. This is often referred to as Passive euthanasia, and is sometimes effected through Do not Resuscitate (DNR) orders. (See also EUTHANASIA, FUTILITY, PROLONGATION OF LIFE, RIGHT TO DIE, TERMINAL CARE, WITHHOLDING TREATMENT). (DM)

**ALPHA-1-ANTITRYPSIN** : See AAT.

**ALPHA-FETOPROTEIN** : See MATERNAL SERUM ALPHA-FETOPROTEIN.

**ALPHA-FETOPROTEIN SCREENING** : A routine maternal serum screening test used for pregnant women to detect pregnancies at high risk for chromosomal disorders or neural tube defects. (See also PRENATAL DIAGNOSIS, TRIPLE TEST). (DM)

**AL-RAZI (RHAZES)** ; 865-925, Muslim scholar, physician and chemist. He was born at Ray, Iran. Author of works on medicine, pharmacology and philosophy. His contribution to medicine was so significant that it can be compared to that of Ibn Sina, his share, greatly influenced the development of science in general and medicine in particular. In his method, he took patient's history and clinical observation in medical practice.

He wrote around 50 books only in medicine and some of his famous books on medicine are: Al-Hawi, which contained various medical subjects and all important information that was available from Greek and Arab sources including his own remarks based on his experiences and views; "Al-Judrai Wal Hassba" was the first book to draw clear comparisons between smallpox and chicken-pox. He also prepared alcohol by fermenting sweet products. (AB)

**ALTERED STATES OF CONSCIOUSNESS**: An abnormal state of mind. Space and time may appear to be suspended, and the psyche (mind/soul) may seem detached from the body (soma). Such a condition may be the result of meditation, mystical prayer, ritualistic ceremonies, orgiastic dancing, sleep deprivation, starvation, shock, hypnosis, mental illness, mind-altering drugs and of course dreaming. (See MEDITATION, DREAM, RECREATIONAL DRUGS, HYPNOSIS, MANIA, DEPERSONALIZATION, DISSOCIATION) (IP & MP)

**ALTERNATIVE ENERGY**: See RENEWABLE ENERGY.

**ALTERNATIVE PARADIGM:** An up-and-coming alternative social framework or world-view. The new environmental paradigm places intrinsic value in the preservation of nature, is eco-centric, based on soft power and soft technology, treats economics only as a means to an end, recognizes limits to growth, condones collaborative, leisurely and sufficiency lifestyles, believes in grassroots organization, decentralization, people power and nonviolent direct action, is non-consumeristic and non-nuclear, promotes sustainable development and ethical value systems, and encourages compassion and tolerance towards other species, human groups, and future generations. (See DOMINANT PARADIGM, PARADIGM SHIFT, GREEN MOVEMENT, PEACE MOVEMENT, ANTI-GLOBALIZATION MOVEMENT, SOFT POWER, SOFT TECHNOLOGY, HIPPIES, NONVIOLENT DIRECT ACTION, ACTIVISM, DEVELOPMENT, SUSTAINABLE DEVELOPMENT, PROGRESS, UTOPIA) (MP)

**ALTERNATIVE THERAPIES :** Unorthodox or unconventional or complementary therapeutic systems and therapies. What is unconventional in some parts of the world may be very conventional in others. For example Ayurvedic and Chinese medicine are unconventional in the West, but quite conventional in the East. Although Western physicians have had a very negative attitude in the past, to what is regarded as unconventional, there are now increasingly many attempts at scientific clinical trials of alternative medicine. The idea of "integrative medicine", seeking to integrate the best from various methods, may replace old ideas of what is conventional and what isn't. Concepts in some alternative therapies, like the energy which is called *ki* in Japanese, and *chi* in Chinese, are a challenge to philosophies of science which, since Newton and Hume, have been trying to rid science of mysterious concepts of energy . (DM)(FL)

The dilutions in Homeopathy, moreover, are a challenge to orthodox chemistry. Sometimes, when new developments seem to contradict science, we reject the new developments. Sometimes, we revise orthodox science. The astronomical observations made after the invention of the telescope were difficult, if not impossible, to reconcile with Ptolemaic astronomy. Rather than rejecting the new observations, Copernicus, Kepler and Galileo rejected Ptolemaic astronomy. It will be interesting to see whether the future will bring a reaffirmation of orthodox science, and a rejection of unorthodox medicine, or the exact opposite. Or perhaps there will be a new synthesis that we have not yet thought of. (DM, FL)

**ALTERNATIVES:** (MP) (See DECISION MAKING, DECISION SUPPORT SYSTEMS)

**ALTRUISM :** Social interaction, a behavior of doing good to another at the expense of its own welfare. Disinterested altruism is a disadvantage from an evolutionary viewpoint. A gene can be altruistic if promotes the welfare of another entity. Opp. Selfish = opposite sense. There are however interested forms of altruism, which may favour survival of the individual or the species, by being cooperative. (JA, DM)

**ALZHEIMER'S DISEASE :** Also called senile dementia-Alzheimer type after Alois Alzheimer, neurologist, 1864-1915. It is characterized by progressive and irreversible mental deterioration, confusion, memory failure, disorientation, restlessness, speech and movement disturbances and hallucinosis (See DEMENTIA; PSYCHOSIS). (IP+DR)

**AMBIGUITY:** Vague or uncertain meaning; the possibility of multiple distinct interpretations of a single expression. Ambiguity and circumlocution are tools used by politicians to avoid sensitive lines of questioning. Ambiguity can be beneficial to the spread of some memes, for example the term "sustainable development" has broad appeal to both environmentalists and developers precisely because of its ambiguity. The ambiguities of language may provide the subtleties of literature, but language precision is centrally important to bioethical policy and scientific discourse where ambiguity can obscure important assumptions or methodological details. (See DEFINITION, EUPHEMISM) (MP)

**AMERINDIAN** : Definition adopted by anthropologists to call the inhabitants of the Americas belonging to one of the three main linguistic families defined by Joseph Greenberg, the Amerind speaking peoples. In modern biological anthropology and genetics, this term has been adopted to designate a group of present-day native American peoples from North-, Central- and South America in all the studies of the biological variation that attempt to characterize the DNA polymorphisms of different loci in these and other human groups. Although the linguistic classification of the Native American languages remains controversial, the term is now coined for the peoples inhabiting this part of the planet. (GK)

**AMINO ACID**: Any of a group of 20 molecules that combine to form proteins in living things. Chemically they contain an amino group, -NH<sub>2</sub>, and a carboxyl group, -COOH. The sequence of amino acids in a protein is determined by the genetic code. There are actually 21 in number, with the 21<sup>st</sup>, selenocysteine, being seldom used. They are the building blocks to form proteins, e.g. Glycine. (DM+JA)

**AMNESIA**: (Greek: *mnasthai* "to forget") Memory loss caused by brain damage or severe emotional trauma. Usually only certain sections of the memory are affected, for example anterograde amnesia is the inability to form new memories since the onset of amnesia, whilst still allowing the retention of language and other basic skills. (See MEMORY IMPAIRMENT) (MP)

**AMNIOCENTESIS** : Diagnostic sampling of the amniotic fluid during pregnancy, usually performed by insertion of a needle into the amniotic cavity which surrounds the foetus during pregnancy. Performed for prenatal screening. (see PRENATAL DIAGNOSIS) (IP, DM). Amniocentesis is followed by either a karyotype (see KARYOTYPE ANALYSIS) to explore the possibility of a chromosomal abnormality in the foetus, or by a molecular genetic test for a particular genetic disease. Usually, amniocentesis is accompanied by genetic counselling; in the case the test results indicate a genetic abnormality in the foetus, parents are given the choice of either interrupting or pursuing the pregnancy. Amniocentesis for Down Syndrome detection is mandatory in many countries for women over 35 years, due to the increased risk from this age on, but in many countries, amniocentesis, and thus, prenatal diagnosis, is not even permitted, on grounds of the illegality of abortion. Nevertheless, bioethicists and lawyers have pointed that the right to know has to be respected above any other consideration. In the case of a positive result for Down syndrome or any other genetic condition, it may help parents and other family members in preparing themselves psychologically to accept the baby, whereas, in the case of a negative result, throwing out the presence of such a problem, the parents are relieved of an unnecessary anxiety during pregnancy (GK).

**AMNIOTIC FLUID** : The fluid in which the fetus floats. (JA)

**AMOTIVATIONAL SYNDROME** : The loss of interest, drive and progress in certain normal aspects of life. These may include social life, for example non-maintenance of friendships, lost interest in outdoor recreation or reduced sex drive; or more commonly in working life, for example a decline in productivity or performance, dropping out of student courses or regular non-attendance at work. Amotivational Syndrome may be an indication of depression, anxiety, persistent drug use or other conditions with symptoms of dullness and lethargy. (See MOTIVATION). (IP+MP)

**AMPHETAMINES** : Central nervous system stimulants, commonly amphetamine sulfate which has the trade name Benzedrine. Developed in the 1920s, amphetamines and their relatives have been used to treat depression, obesity, narcolepsy and attention deficit hyperactivity disorder. Amphetamines are subject to abuse because of their stimulant properties, which include wakefulness, excitement and increased energy levels,

but they are also attractive because of their ability to generate an addictive euphoria when they are ingested, injected or snorted. Abuse can lead to compulsive behavior, dependence, hostility, paranoia, hallucinations, physical deterioration - particularly cardio-vascular - and suicidal tendencies. Regular use may also lead to serious amphetamine-induced psychosis. Amphetamines have many street names such as "speed", "black beauties", "lid poppers", "pep pills" but also "base" which is much stronger, and "crystal meth" or "ice" which is a smokable crystalline derivative of methylamphetamine. As for most toxic addictive drugs, it takes strong motivation to quit, however, users should at all times take care to prevent conception since amphetamine abuse adversely affects sperm quality and *in utero* fetal development risking postnatal wellbeing. (See RECREATIONAL DRUGS, INTRAUTERINE GROWTH RETARDATION). (IP)

**AMPHIBIA:** See FROG EXTINCTIONS.

**AMYGDALA:** (Greek: "almond") Part of the brain's limbic system, specialising in their lives. (See EMOTION, EMOTIONAL INTELLIGENCE) (MP)

**ANABOLIC STEROIDS:** Synthetic compounds with a molecular structure similar to the male sex hormone testosterone. The anabolic component promotes muscle growth and the androgenic component acts upon masculine traits in the body. They have an important function in general medical applications as; for example, in replacement therapy for men with low testosterone levels, but are also commonly illegally used as performance-enhancing drugs in dosage regimes 10 to 100 times the accepted therapeutic range. Performance enhancement is suitable for weight lifting, body building, power lifting and field events where they permit athletes to train longer and harder with improved competitiveness due to heightened aggression. Uncontrolled steroid use is damaging to health and can cause liver dysfunction and increased risk of cardiovascular disease and cancer. Unscrupulous scientists, malpractising doctors or misguided administrators can create a rationale that international success, especially in the Olympic Games, implies the use of performance-enhancing drugs where disputes surrounding the legality of some winning performances (catching "Fool's gold"). Traces can last for years (see ERYTHROPOIETIN or EPO). (IP).

**ANAEROBE:** (Greek: *an* + *aer* "without air" + *bios* "life") any microorganism which lives and grows in the absence, or almost absence, of oxygen. They are widely distributed in nature with just a few being infectious occurring, typically, in deep puncture wounds that exclude air or in tissue that has diminished oxygen-reducing potential. Common examples of anaerobic infections are gangrene, tetanus and botulism - the last a source of poisoning from improperly cooked or canned foods (see BOTULISM; ENDOTOXIN). (IP)

**ANAEROBIC:** Any species which generally lives in the absence of oxygen (Greek: *an* + *aer* "without air" + *bios* "life"). (IP)

**ANAEROBIC EXERCISE :** Muscular exertion sufficient to result in metabolic acidosis resulting from accumulation of lactic acid - a product of muscle metabolism. This form of strenuous exercise should be avoided at all costs during pregnancy because strenuous physical activity results in many physiological changes that can affect the wellbeing of the fetus. Some of these changes are obvious; for example, severe exercise stimulates increased production of noradrenaline causing immediate contractions of the uterus, which may negatively affect the uteroplacental circulation and the fetus. The most serious argument against endurance sport and also prolonged immersion in saunas during pregnancy concerns the consequences of maternal hyperthermia or overheating. Animal studies have shown a consistent relationship between birth defects and exposure to high temperatures, although the data on human pregnancy and elevated temperature are not as consistent. Hyperthermia has at least four deleterious effects a) teratogenic effects of core temperatures of greater than 40 degrees C in early pregnancy have been conclusively demonstrated in animal studies b) effects of elevated temperature on oxygen hemoglobin-binding curves makes oxygen uptake by the fetal blood more difficult c) effects of increased maternal oxygen consumption due to temperature-induced elevated

metabolic rate reduces oxygen availability for fetal consumption d) increased maternal blood flow to the skin for thermoregulation decreases uterine irrigation affecting placental transport of oxygen and nutrients. (See AEROBIC EXERCISE; ANAEROBIC; HYPERTHERMIA). (IP)  
**ANALOG** : (Greek *analogos* 'proportionate'). 1. Likeness in appearance or function but not in evolutionary origin; for example, the insect eye and the mammalian eye - hence analogous. 2. Numerical information (as in analog computer) that is represented in the form of a quantity (usually a voltage) that varies in equal manner as the data but is convenient to manipulate mathematically. (See DIGITAL, COMPUTER). (IP)

**ANALOGOUS** : See ANALOG.

**ANALOGY** : (Greek *analogia* 'proportion'). In mathematics the identification of a general agreement or similarity between two problems or methods. For instance, analogy is used to indicate the results of one problem from the known results of the other. In biology the identification of a resemblance of form or function between organs essentially different; that is, not of common evolutionary origin. For instance, the wings of birds are analogous to the wings of insects. (See METAPHOR). (IP)

**ANALYSIS** : (Greek *ana* + *lyein* 'to loosen'). The branch of mathematics that uses the concept of limits - resolution to simple elements. In chemistry/biology the separation of substances into their constituent parts and the determination of their nature; for example, qualitative analysis determines what elements are present while quantitative analysis determines the quantity of each element. (See ANALYSIS OF VARIANCE, SCIENTIFIC METHOD, STATISTICS). (IP)

**ANALYSIS OF VARIANCE**: Analysis of Variance (ANOVA) is a series of statistical procedures for determining whether differences among groups of data are attributable to chance alone. A significance test, it determines whether there is a *significant difference* between the means of a number of treatment groups. As a common technique for comparison of two or more populations, care should be taken to coordinate experimental design with its requirements. Design considerations and elements of ANOVA include one-way ANOVA, two-way ANOVA, multi-factorial comparisons, randomized block designs, orthogonal designs, nested or hierarchical analyses, transformations of data, degrees of freedom, significance level and probability of Type I and Type II Errors. Tests for *homogeneity of variance* include Cochran's Test for balanced data, and Bartlett's Test for unbalanced data. *Analysis of Covariance* combines regression techniques with analysis of variance. (See ANALYSIS, VARIANCE, STATISTICS, SIGNIFICANCE LEVEL, TYPE I ERROR, CHI-SQUARE TEST, SCIENTIFIC METHOD) (MP & IP)

**ANALYTIC PHILOSOPHY**: A movement begun at the beginning of the twentieth century by Bertrand Russell, Alfred North Whitehead and G.E. Moore in England, by Ludwig Wittgenstein in Austria and England and by Gottlob Frege in Germany. Originally it was an extremely demanding discipline of analysing scientific and mathematical language in terms of mathematical logic. It was thought that all knowledge consists of sense experience expressed in logical form, except for mathematics which is entirely formal. Mathematics, therefore, was thought of as a branch of logic, and all mathematical truths were to be proved from axioms of logic. (Axioms of logic are obviously true contentless statements like: "Either it is or it isn't".) In 1931, however, this was shown to be a hopeless dream when Kurt Godel published a paper proving that in any logical system which is strong enough to formulate simple arithmetic, there will be true statements which cannot be proven from the axioms of the system.

While analytic philosophy was highly mathematical at Cambridge, Oxford philosophers developed the "ordinary language" school of



philosophy, analysing concepts by observation of how we use words in ordinary speech. Gilbert Ryle believed, for example, that neurobiology is irrelevant to the study of the mind: we only need analyse our uses of mental words, like "think", "feel", "imagine", etc, in ordinary language. Ethics became no longer an enquiry into what is right and what is wrong but an enquiry into how we use words like "right and wrong". An offspring of this approach is today's "descriptive bioethics". But while Oxford ordinary language philosophy was highly parochial, restricting one's investigation to how English-speaking people use words, descriptive bioethics uses international surveys to try to bridge cultural relativism. (FL)

**ANARCHISM:** The term is often used pejoratively, with associations of violent lawlessness. But it also has positive meanings having to do with the attempt to live without government, coercion or any uniformity of practice imposed from above. In politics, the doctrine is difficult to carry out in practice when defense requires some form of governmental organization. In individual life, however, it can be more practical and some have succeeded in living quite well while ignoring government and other coercive institutions.

A bioethical attitude inspired by anarchism is one's taking care of one's own health -- carefully observing the effects of foods and lifestyles on one's health, for example -- rather than living and eating thoughtlessly and then running to physicians to get one out of trouble. In clinical ethics, an attitude inspired by anarchism would be the rejection of national or international -- or even hospital-wide -- laws or guidelines for DNR, abortion, candidacy for IVF, etc, leaving the decisions up to ward staff meetings, including doctors, nurses and social workers, together of course with patient and family. (FL)

**ANCIENT WISDOM** Some people think that humans are getting wiser and more ethical in every generation. Others think that we are getting less wise and less ethical. Many cultures have traditions of ancient wisdom, which is thought of as better than what we have today. Much of these traditions are based on the idea that prophesy belonged only to the ancients, because God, or the gods, only spoke to people in the old days. But there is no emphasis that this is true. It is just as likely that there be prophesy in every generation, or perhaps prophetic periods of history, followed by empty ones, which are followed by new prophesy. (FL)

**ANDROID:** (Greek: *andros* "man" + *eidos* "form") Pre-dating the word "robot", the term "android" was used in reference to any machine designed in the human image or constructed to imitate human actions. In contemporary popular culture, an android is a robot difficult to distinguish from human flesh and form, perhaps a cybernetic combination of biochemical and electromechanical components. (See ROBOT). (MP)

**ANENCEPHALIC:** Literally the condition of having no encephalon or brain (normally applied to fetuses or infants with no cerebrum). Anencephaly is the congenital absence of all or a major part of the brain. (DM)

**ANESTHESIA:** The partial or complete loss of sensation with or without consciousness as the result of injury, disease, or administration of an anesthetic. (DM)

**ANEUPLOIDY:** Refers to an abnormal number of chromosomes observed in a karyotype. The number can be either higher (presence of a trisomy), or lower (presence of a monosomy). (JA+GK)

**ANGEL:** A spiritual being, perhaps endowed with personality. They were extensively analysed in Jewish philosophy of Maimonides (Moshe ben Maimon) and in the Christian philosophy of St Thomas Aquinas. Although Judaism, Islam and Christianity are sometimes thought of as "monotheistic" religions, recognizing only one God, as opposed to "polytheistic" religions which have many, it is hard to find any ontological difference between the angels of the Hebrew Bible and the gods of Hinduism and Shinto. And the Bible describes the prophets as having had

many interactions with angels. Indeed there are traditions both in Shinto and in Hinduism, which interpret the many gods just like Judaism interprets angels, as many different appearances of one infinite god. (The ancient Greeks and Romans, in contrast, do not seem to have had any concept of this unity.) So the distinction between monotheistic and polytheistic religions seems to disappear, making possible more toleration of diverse religions and cults as representing many different ways of approaching one infinite God (an attitude once argued for by Sri Aurobindo).

Many scientific people today doubt that angels exist. But many scientists believe in infinitely many non-physical entities, like "sets" and "numbers", whose existence has never been proved. Unlike sets and numbers, however, angels are thought of as active. But sub-atomic particles are also very active. And sub-atomic particles do not seem to be physical objects. Because if Heisenberg was right about indeterminacy then it follows that sub-atomic particles are not physical objects. For sub-atomic particles, according to Heisenberg, have no determinate (but only statistical) simultaneous location and motion. But it is part of being physical that an object, at any given time, is at a specific place with a specific (possibly zero) motion. So we have an example of scientifically recognized non-physical objects.

Socrates thought that a daemon was guiding his conscience. The 17th Century French mathematician, physicist and philosopher, Descartes, contemplated the possibility that an evil angel was confusing his thoughts, and at about the same time Milton, in England, was writing "Paradise Lost" about "fallen angels" confusing people's ethics. The idea of angels influencing our ethics may have been a way of expressing the feeling that some of our life decisions (bioethics) are neither the result of education nor of rational investigation, but are things we are driven to do by causes which we do not understand. (FL)

**ANGEL DUST** : See PHENCYCLIDINE HYDROCHLORIDE.

**ANGER**: A negative emotional reaction associated with other bad feelings such as fear, disgust, shame, irritability, outrage, hostility and possibly even violence. Actions resulting from anger often have negative consequences, because the neurotransmitters/hormones (e.g. adrenaline) released during anger intensify impulsive action and cloud rational thought processes. (See AGGRESSION, ADRENALINE, FEAR, CONFLICT MANAGEMENT, EMOTIONAL INTELLIGENCE, TRANQUILITY, JOY) (MP)

**ANGIOSPERM**: The flowering vascular plants which dominate many terrestrial habitats such as deciduous forest, sclerophyll forest and rainforest. Class Angiospermae is primarily differentiated from the Gymnospermae by its mode of reproduction, which is via the seed, the fruit and the flower with its pistil and stamen. Angiosperms are divided into monocotyledonous and dicotyledonous plants. (See FLOWER, HARDWOODS, GYMNOSPERM) (MP)

**Å NGSTROM** : A unit of length defined as  $10^{-10}$  meter. Å is used to express wavelengths of light, ultraviolet radiation and sizes of molecules. (IP)

**ANIMAL** : A living being with a capacity for spontaneous movement and a rapid motor response to stimulation. Animals can be divided into two groups, invertebrates (animals without backbones) and vertebrates (animals with backbones). (DM)

**ANIMAL CARE COMMITTEES** : Institutional committees established to protect the welfare of animals used in research. A type of ethics committee that focuses on the welfare of nonhuman animals. (See also ANIMAL EXPERIMENTATION). (DM)

**ANIMAL EXPERIMENTS** : An experimental procedure conducted upon a non-human animal. These may be conducted for a variety of

purposes, including education, medical research, cosmetic testing, product safety. There are ethics committees in many countries to regulate the experimental nature, procedure and justified purposes. (See ANIMAL RIGHTS, CLINICAL TRIALS). (DM)

**ANIMAL HOUSE** : A place where animals are reared and bred for experimental research, or laboratory testing, of cosmetics and other chemical substances prior to wider use. (JA+DM)

**ANIMAL RIGHTS** : A right is a thing to which an entity is entitled, for example, the 'right to free speech'. Traditionally only human beings have been said to possess rights and even then the term 'rights' is understood by many philosophers as having only legal currency rather than moral authority. The notion of animal rights extends rights to certain non-humans, typically those with sentience, that is, the ability to feel pleasures and pains. Those who advocate animal rights maintain that to allow humans rights but to deny them to all other species is speciesist - which is unacceptably discriminatory. There is an ethical and legal move to ascribe rights to Great Apes, and New Zealand has enacted laws which do. The UK and European Union have not enacted laws which ascribe rights to the Great Apes but it has stopped the practice of using Great Apes in medical experiments, whatever the purported benefits. (See GREAT APE PROJECT, HUMAN RIGHTS) (MR+DM)

**ANIMAL TESTING ALTERNATIVES** : Procedures, such as tissue culture and mathematical models, that are used in place of the use of animals in research or diagnostic laboratories. (DM)

**ANIMAL WELFARE**: The entitlement of animals to protection from cruelty and abuse, or to not be used solely for the benefit of humans. (See BIOCENTRIC). (DM)

**ANIMISM** : The belief that the boundary between human and non-human is fluid so that the things of the world, both animate and inanimate, are spirited and able to communicate or be spiritually affiliated with humans (see Dreaming). In the modern context most of us now wish to see ourselves more as a participating member of Nature by giving due regard to the interdependence of all living systems and their further dependence on physical cycles. This acknowledgment is a significant intellectual advance as it undercuts the dualistic Greco-Roman view of human and natural systems being distinct from one another and links back to ancient understandings, as substantiated in Paleolithic cave paintings at Lascaux and Altamira and the Dreamtime depictions in Aboriginal rock art. Our hunter ancestors knew Nature and its creatures (many of whom were also their deities) and respected their ethical right to exist alongside humankind. Animism probably served as an adaptive ecological mechanism by impressing a bioethical restraint upon overexploitation and abuse (see TOTEMISM & AUSTRALIAN ABORIGINAL) (IP+AG).

**ANNELIDA** : (Latin: *ānulus* 'ring') The zoological phylum containing annelid worms with an internally and externally segmented body and hydrostatic skeleton. Annelida includes the classes Polychaeta (marine worms), Oligochaeta (earthworms) and Hirudinea (leeches). (MP)

**ANOMALY** : See DEVELOPMENTAL ANOMALY.

**ANONYMITY** : Without a name. The concept is used in databases to protect the privacy of an individual sample by deleting the name, or identifiable information. The removal of the identifying information can occur before entering the storage facility, or database, or after. (DM)

**ANONYMOUS TESTING** : Epidemiological testing in which the source of the specimen or the person being tested is not individually identified; often used in testing for the prevalence of a disease. (DM)

**ANOREXIA ATHLETICA**: is an exercise addiction which often overlaps with eating disorders such as anorexia nervosa or bulimia where the cycle of forced, prolonged exercise (swimming, running, dancing) and decreasing food intake forms the basis of activity anorexia. In order to maintain an adequate energy balance, caloric needs for non-essential bodily functions; such as reproduction, are suppressed. In the human

context, anorexias may have resulted from natural selection favoring those individuals who become active in times of food scarcity as stopping to eat is negatively balanced against reaching an area where food may be abundant (see ANOREXIA NERVOSA; BULIMIA NERVOSA; OBESITY). (IP)

**ANOREXIA NERVOSA:** (Greek: *a + orexis* 'no appetite') An eating disorder characterized by a prolonged revulsion to eating resulting in emaciation, loss of periods, and emotional disturbance concerning body image and fear of becoming obese. The cause of thinness cannot be attributed to a primary endocrine (hormonal) disorder but the conditions of anorexia nervosa, bulimia nervosa, emotional deprivation and calorie restriction can cause secondary endocrine abnormalities; such as delayed or absent puberty and infertility. The condition is primarily a maturational problem in adolescents who, in the majority of cases, come from dysfunctional family homes. For example, a significant proportion of patients with eating disorders were sexually molested by a family member or friend during childhood, or who associated eating with emotional distress, conflict and anxiety states (Greek *a + orexis* meaning no appetite) (see BULIMIA NERVOSA; ANOREXIA ATHLETICA; OBESITY) . (IP)

**ANOVA:** see ANALYSIS OF VARIANCE.

**ANOSMIA :** (Greek *a + osme* 'without smell'). 'Odor blindness' - the total loss or impairment of the sense of smell. Anosmia may be temporary resulting, for example, from an obstructive respiratory infection or a blow on the head which may damage the olfactory receptors, or be permanent as a result of an irreversible damage to any part of the olfactory apparatus. Sometimes anosmia (the so called specific anosmias) does not involve a total loss or reduction of the sense of smell but is instead specific to particular substances; for example, 3% of the population has trouble smelling the odor of sweat, 12% have diminished sensitivity to musky odors. It is important to note that anosmia may be induced by injuring the olfactory receptors consequent to inhaling caustic substances such as lead, zinc sulfate, or concentrated matter such as cocaine. (See OLFACTION, SENSES). (IP)

**ANTARCTICA :** The continent at the South of the planet Earth, where the South Pole is located. A landmass covered with ice, up to several km thick, because it is below freezing. The Antarctic Treaty is an international treaty against commercial exploitation of the mineral resources of this continent, intended to prevent pollution. Many nations have research bases on the continent, and some claim territory of Antarctica or islands off its coast. (DM)

**ANTE- :** Prefix denoting 'before' in space or time. (See PRE-, ANTI-) (MP)

**ANTENATAL DIAGNOSIS :** See PRENATAL DIAGNOSIS.

**ANTHRAX :** One of the powerful bacterial biological weapons *Bacillus anthracis* occurs in many different strains as skin and inhalation strains, stable in spore condition, on contact it multiplies, its toxins cause hemorrhage leading to death. (JA)

**ANTHROPIC PRINCIPLE:** (Greek: *anthropo* 'human') Coined by Carl Sagan and developed in John Barrow and Frank Tipler's ' *The Anthropic Cosmological Principle*'. (See OMEGA POINT THEORY, PARALLEL UNIVERSES THEORY, HOLOGRAPHIC UNIVERSE THEORY, ANTHROPOCENTRIC) (MP)

**ANTHROPOCENTRIC** : A belief, doctrine or attitude in which the Universe is regarded as centered around humankind and organized in terms of human values). Anthropocentrism has been fostered by religious beliefs, placing human beings at the center of Creation, until scientific theories laid down by Darwin, Wallace and other naturalists in the mid-XIX<sup>th</sup> century have demonstrated that all living beings have common evolutionary roots and share mutual interdependence relationships, including our species. Bioethics based on anthropocentric views overlooks the many issues in which other species are involved, centering its attention only on human beings. ((see BIOCENTRIC). (IP, GK).

**ANTHROPOLOGY**: (Greek, Anthrope : man) The study of humans, regarded as the most scientific of the humanities and the humanity of the sciences. Study of human origin, social development and political organization, language, religion and art. (JA)

**ANTHROPOMORPHISM**: (Greek: *anthropos* "man" + *morphe* "form") The attribution of human qualities to animals, inventions and other non-human objects or organisms. Although animals may not display properties related to human intelligence, they may have variations on other human qualities such as emotions and feelings like sadness or pain. (MP)

**ANTHROPOSPHERE**: (Greek: *anthropo* "human" + *sphaira* "globe") The realm of human activity and infrastructure, a rapidly growing component of the biosphere. The anthroposphere has an input of materials and natural resources, and outputs a flow of waste materials. (See BIOSPHERE) (MP)

**ANTI-** : Combining prefix denoting 'against', 'reverse' or 'in opposition to'. (See ANTE-, MAL-, PSEUDO-, META-) (MP)

**ANTI-ANXIETY DRUGS** : See ANXIOLYTICS and ANXIETY.

**ANTIBIOTIC**: (Anti=against; bios = life) Anti = against, bios = life, substances produced by plants/animals/microbes which can kill microbes or inhibit their growth. Synthetically produced to stop microbial infection. (Bioactive compounds)(JA)

**ANTIBIOTIC RESISTANCE** : The ability of microorganisms to adapt and survive high concentrations of a normally lethal antibiotic. The resistance is acquired by the natural selection of resistant mutants in the presence of low concentrations of this antibiotic; however, the production of resistant strains of microorganisms can also be artificially created by means of genetic technology. Antibiotic resistance is often an accidental result of medical overprescription. Another reason is the environmental release of large quantities of antibiotics which are added to the feed of factory-farmed animals. The accidental acceleration of antibiotic resistance generates an urgent race to create new drugs for combating human disease. (See ANTIBIOTIC, ANTIBIOTIC OVERPRESCRIPTION). (IP+MP)

**ANTIBIOTIC OVERPRESCRIPTION** : The overuse or overprescription of antibiotic drugs may result in the accelerated adaptation of resistant strains of microorganisms in the patient and the environment. Hospitals are one of the more common breeding grounds for antibiotic resistant bacteria. Antibiotics are often considered a generic treatment, and in many less developed countries are generally sold over the counter without a prescription or specialist advice. Careless use of antibiotics may also have other side effects, such as the death of useful symbiotic bacteria in the gut, or damage to the structure and function of the ear. For example, antibiotics called aminoglycosides (neuromycin, kanamycin, dihydrostreptomycin and vancomycin) may irreversibly damage hearing by attacking the hair of the cochlea, while streptomycin and gentomycin may affect coordination and balance - if continued, nerve deafness may occur. (See ANTIBIOTIC, ANTIBIOTIC RESISTANCE). (IP+MP)

**ANTIBODY** : Immune related protein produced by the body in response to a specific antigen. A blood protein (immunoglobulin) produced by

white blood cells in response to the presence of a specific foreign substance (antigen) in the body, with which it fights or otherwise interacts. Antibodies recognize thousands of different antigens through their highly variable antigen-binding regions, and interact with leukocytes and/or complement components to destroy the antigen. Antibodies to sperm, if present, can impair fertility by causing agglutination of sperm. Antibodies against natural components of the body can also be generated, inducing an autoimmune response and subsequent destruction of the tissue (i.e. in insulin dependent diabetes mellitus, lupus erythematosus or rheumatoid arthritis). (DM+GK+JA)

**ANTICODON** : Complementary to the codon of triplet code on a tRNA attracted to a complementary codon on mRNA. (JA)

**ANTICOPYRIGHT**: A term referring to new publications which are legally open to duplication and distribution to the widest possible audience. Poor nations are those most in need of ethical, environmental, social and medical information and resources. Anticopyright status may only be limited to poorer nations or non-profit organizations, in order to maintain economic incentives. Activist and subversive literature often bears an anticopyright label, and the internet has provided a free platform for many of the scientific and medical journals. (See COPYRIGHT, ANTI-PATENTING) (MP)

**ANTIDEPRESSANT DRUGS** : Drugs for the treatment and control of depressive illness. There exist three major groups of antidepressant drugs the monoamine oxidase (MAO) inhibitors, the tricyclic antidepressants and the latest generation serotonin re-uptake inhibitors. The latter are favored for their selective action, since the tricyclics affect a broader range of neurotransmitter systems, and MAO inhibitors can potentially interact dangerously with certain food constituents. Lithium is also used to treat bipolar disorder (manic depression), and various herbal remedies (e.g. St. John's Wort) are also used to combat depression. (See SEROTONIN RE-UP TAKE INHIBITORS, PROZAC, LITHIUM, MONOAMINE OXIDASE, BRAIN NEUROTRANSMITTERS). (IP+MP)

**ANTIDOTE**: A drug which neutralizes poisons and their effects. Antidotes may react chemically to produce harmless compounds, act mechanically to prevent absorption, or perform physiologically to produce opposite effects to the poison. Usually the stomach should also be pumped to remove the poison (and the occasionally toxic antidote), however not when this may cause damage in patients who have ingested caustic agents. (See POISON) (MP)

**ANTIGEN** : A foreign protein/polysaccharide, initiates immune response to form antibodies specific to it. (JA)

**ANTI-GLOBALIZATION MOVEMENT**: A global collective of concerned people remarkable for its breadth and diversity, including workers groups, industrial unions, human rights advocates, social workers, ethicists, environmentalists, socialists, anarchists, anti-capitalists, the anti-war movement, green movement, advocates of fair trade, forgiveness of third world debt, anti-patenting of pharmaceuticals/genes, workers rights and ecology, including people from mainstream society in both the developed and developing worlds. Commentators on the globalization debate in no particular order include George Monbiot, Susan George, Edward Herman, Naomi Klein, Anita Roddick, Ralph Nader, Charles Handy, John Ralston Saul, Francis Fukuyama, Samuel Huntington, John Micklethwait, Lester Thurow, Noam Chomsky, Michael Albert, Michael Moore, David Ransom, John Pilger, Vandana Shiva, Maria Mies, Joseph Stiglitz, David Pearce, Hunter Lovins and others. The anti-globalization movement dramatically increased its presence in the media and public consciousness with the 1999 Seattle protest gathering during the World Trade Organization conference, marred by rioting and security clashes. One section of the anti-globalization movement believes that any system which has lost control of what's good, freedom, justice, human rights, responsonal trade agreements and global institutions (f sustainable development, global equity and etOBEDIENCE, PROTEST, PROGRESS, GLOBAL VILLAGE) (MP)



**ANTIHISTAMINES:** Drugs which block the histamine receptors of cells to prevent allergic response. Antihistamines are used to treat allergic rhinitis (hay-fever), allergic rashes, asthma, and the common cold. Side effects may include sleepiness, dizziness and dry mouth. (See ANTIBIOTICS) (MP)

**ANTIMISSILE:** A missile or other defensive measure, which involves the interception and destruction of attacking enemy missiles. (MP)

**ANTIOXIDANTS :** are substances which delay the oxidation (spoilage) of matter, for example, raw vegetable oils contain natural antioxidants which reduce the speed of deterioration. Antioxidants are deliberately added to prepacked foods and drugs in order to delay degradation by oxidation and increase their shelf-lives. The consumer is often led to believe that vitamin supplements having antioxidant properties should be taken daily, however, the rationale for daily use of such products has not been established. In general, healthy adult men and non-pregnant women consuming a normal varied diet do not need vitamin supplements. (See VITAMINS; FREE RADICALS). (IP)

**ANTI-PATENTING:** A term referring to the movement against the patenting of products which increase environmental quality and social wellbeing. Products designed for sale in the developed world can be beyond the economic reach of people in less developed nations, for example drug patents prevent equitable availability to those living with HIV or dying of other diseases. The free or economically-scaled release of such bioethical products should be encouraged and subsidised. (See PATENT, ANTICOPYRIGHT) (MP)

**ANTIPSYCHOTIC DRUGS :** Drugs used to treat severe mental illnesses such as aggressive psychosis, schizophrenia, bipolar disorder, mania and severe depression. They usually normalize the action of dopamine and possibly other neurotransmitters. Although antipsychotics can save people from the need for incarceration, they may have serious side effects such as dyskinesia (tremors), ataxia (staggering), seizures and lethargy. It is perhaps well to bear in mind that one-third to one-half of psychotic patients improve symptomatically - or show constructive personality change - without prescribed medication. When assessing drug effectiveness care must be taken to include adequate control groups - either untreated or treated by another type of therapy in order to avoid possible long-term risk. (See COGNITIVE BEHAVIORAL THERAPY, LITHIUM). (IP+ MP)

**'ANTISENSE' RNA:** RNA that is complementary to the nucleotide sequence of normal mRNA. It therefore forms a duplex with the mRNA preventing the mRNA being used in protein synthesis, thus indirectly controlling gene expression. (DM)

**ANTI-REDUCTIONISM:** Reductionism, a doctrine deriving from Auguste Comte, says that "higher-level" sciences can always be reduced, ie explained in terms of "lower-level" or more fundamental ones. Thus sociology is explained in terms of psychology, which is explained in terms of physiology, which is explained in terms of biology, which is explained in terms of chemistry, which is explained in terms of physics, which is explained in terms of mathematics. Thus all history, international relations, human relations and our mental and emotional lives are really matters of particle physics formulated mathematically. Genetic Reductionism is just a special case of reductionism explaining human life in terms of molecular genetics.

Anti-Reductionism has been formulated in terms of a number of different arguments: (I) "Not even all clinical phenotypes can be attributed to single genes, so obviously not all personality types or patterns of human action can be attributed to single genes": to which the answer is that genetic reductionism need not be single-gene reductionism, but can explain each phenotype in terms of multiple genes. (II) "Human characteristics, including clinical disease, are rarely explainable in terms of genetics alone. There are also environmental -- including nutritional and educational -- co-factors.": to which the answer is that while the objection may refute Genetic Reductionism, it does not refute Reductionism in general, because maybe environmental cofactors may eventually be explained in terms of mathematical physics. (III)

"Reductionism leads to the denial of free will": to which the answer is that this begs the question. Maybe free will is just an illusion anyway. (IV) "Reductionism has never been proved. Has anyone ever shown how we can really explain international relations as events on the subatomic level?": to which the answer is that we need patience. Let's see how science develops, in the meantime leaving Reductionism as an open possibility. (V) "Reductionism takes the spiritual out of life, by making everything mathematical physics." To which the answer is that maybe subatomic particles are less material and more spiritual than we have thought, as explained in the entry ANGELS (q.v.) (FL)

**ANTI-SEMITISM:** Semites are a loosely interrelated group of populations speaking similar languages, including Hebrew, Arabic, and such Ethiopian languages as Geez, Amharic and Tigrinya. But "Anti-Semitism" usually means the hatred of Jews. Anti-Semitism was a central doctrine in Nazi ideology. (FL)

**ANTISOCIAL:** Antisocial behavior conflicts with societal expectations, and may range from harmless eccentricity, through rudeness and negativity, to aggressive or psychotic behavior. (See ASOCIAL) (MP)

**ANTIVIVISECTION:** A movement against invasive experimentation or teaching using live animals. Nowadays, the movement has taken more moderate forms, such as the Fund for the Replacement of Animals in Medical Experimentation, which teaches the "Three R's": Replacement (of animals with tissue cultures and computer modeling), Reduction (of the number of animals used in each trial), and Refinement (of experimentation by less painful methods). The publish a scientific journal called *Alternatives to Laboratory Animals* , and other journals also exist. (FL)

**ANTI-WAR MOVEMENT:** See PEACE MOVEMENT

**ANXIETY :** (Latin *anxietas* ) anticipation of impending dread, danger or misfortune not associated with an apparent stimulus and accompanied by tension, restlessness and other adrenaline-generated physiological symptoms such as increased heart rate, throat tension, gut cramps, tremors, cold sweats and insomnia. Psychological symptoms are subjective and often "free-floating". Typical signs of psychological distress include irritability, sensitivity to constructive criticism, uneasiness about the future, feelings of uncertainty and helplessness, unconscious conflict regarding life's essential values and goals. Anxiety disorders are complex and may take different forms (generalized anxiety, separation anxiety, panic anxiety, situational variables. Anti-anxiety drugs (anxiolytics), by helping to control the physiological symptoms, provide relief. The definitive treatment, however, rests on example changes in health, self-concept or environment, maturational crises or subconscious conflicts. Anxiety differs from depression, but is typically like FEAR, ANXIOLYTICS, DEPRESSION, GENERAL ADAPTATION SYNDROME). (IP+MP)

**ANXIOLYTICS:** Anti-anxiety drugs, including sedatives and minor tranquillizers, used temporarily to treat panic and anxiety reactions in conjunction with counseling to address related underlying life-factors. (See ANXIETY) (MP)

**ANZECC :** Australia and New Zealand Environment and Conservation Council.

**APARTHEID:** A political system in which people of different races are separated. In the past in South Africa for much of the twentieth century. (DM)

**APATHY:** A state of not caring; not wanting to know; complacency; indifference; to ignore; disinterested in contemplation; anesthetized by popular culture; a postmodern intellectual narcosis; compassion fatigue; too lazy; too busy; self-indulgence; limited choices in work and leisure-time; non-reflection, non-deliberation and subconscious blocking of distressing information. Apathy is less ethically excusable than ignorance. Apathy implies at least subconscious knowledge of the truth - if those who know will not take action, then those who don't know certainly won't, and those who are the subject of oppression or ethical concern usually can't. (See IGNORANCE, UNCERTAINTY) (MP)

**APE :** A class of biological organisms that are primates. Homo sapiens, chimpanzees, gorillas and orangutans and so-called Great Apes. (See GREAT APE PROJECT). (DM)

**APGAR SCORE :** The evaluation of an infant's physical condition, usually body color) that reflect the infant's ability to adjust to extrauterine life. The initial scores are for color and respiratory effort, and if the infant's respiratory and circulatory changes have been completed satisfactorily, the muscle tone and reflex responses can be. The system was developed by the American Anesthesiologist Virginia Apgar (1909-1974) for the rapid identification of oropharyngeal passage) or transfer to an intensive care unit. (IP)

**APHRODITE:** In Greek mythology the Goddess who represented sexual love and the joy of life. She represented two kinds of love - the satisfaction of the fleshly desires and the essential quality of good in the person who loves to perfection (see VENUS).(IP)

**APOCALYPSE :** The end of the world. (DM)

**APOPTOSIS :** (Greek: *apo* 'away' + *ptosis* 'falling') Programmed cell death is the mechanism whereby damaged, malfunctioning or unnecessary cells can be removed from the body. All animal cells carry an intrinsic genetic "death" program which is important in growth and development, and in the repair and maintenance of mature body tissues. Apoptosis is not a cause of aging; however defects in this system may contribute to age-related processes (Greek *apo* meaning away and *ptosis* falling). (IP)

**APPLIED ETHICS:** If theoretical ethics studies the meaning of ethical terminology and the foundations of ethical thinking, applied ethics studies the application of ethical reasoning in real life. The distinction is the same as that between Foundational Bioethics (studying the foundations of bioethical reasoning in culture, spirituality, religion, law and philosophy) and Applied Bioethics (including clinical medical and nursing ethics, environmental ethics, research ethics, etc.) There is a philosophical journal called *Applied Ethics* . (See APPLIED MATHEMATICS, APPLIED PSYCHOLOGY) (FL)

**APPLIED MATHEMATICS :** The study of the mathematical techniques used to solve problems; that is, the application of mathematics to existing systems. (See APPLIED ETHICS, APPLIED PSYCHOLOGY). (IP)

**APPLIED PSYCHOLOGY :** That part of psychology which places its knowledge to effect in practical situations. Important branches of psychology which emphasize practical rather than theoretical approaches are educational psychology, clinical psychology, child psychology and industrial/occupational psychology. (See APPLIED MATHEMATICS, APPLIED ETHICS). (IP)

**AQUABOT:** Aquatic robots, or autonomous underwater vehicles. These small devices can navigate in three dimensions and use sensors to collect oceanographic data, carry out underwater mapping, measure effluent pollutants, gather military intelligence or sweep mines. Future generations of aquabots may be schooled to create a moving sensor array, and of course may also potentially be weaponized. (See ROBOT) (MP)

**AQUACULTURE** : (Latin: *aqua* 'water' + *culture*) A form of agriculture where plants and animals are cultured in farms in fresh water bodies. When seawater is used then it is called mariculture. In fish farming areas fishes like Tilapia and other commercially valuable fishes can be cultured. In a marine ecosystem shell fishes like *Perna viridis* (green mussel) oysters are cultivated as a commercial enterprise. (JA)

**AQUINAS, THOMAS** (1225? -1274) : The greatest of the medieval *Scholastic* philosophers, canonised as Saint Thomas by the Catholic Church. His philosophy is called *Thomism* . The *Scholastics* were Catholics who were known for their detailed, logical debates, often dwelling on fine and seemingly sterile distinctions to the point that they have been accused of "hair splitting". It was joked about them that they would debate for years about how many angels could dance on the point of a pin. The joke is unfair. Aquinas' detailed method of question and argument did not always lead to results. But -- like mathematical games -- it engendered habits of careful and penetrating logical thinking, which became part of the European intellectual tradition.

Following the example of the *Guide to the Perplexed* of MAIMONIDES (q.v.), whose influence Aquinas sometimes acknowledges, Aquinas interpreted the Bible according to Aristotelian philosophy. Although this practice was at first objected to by other Church authorities, it eventually became so embedded in European Christian culture that disagreeing with Aristotle was considered to be at least as heretical as disagreeing with Jesus. This attitude remained until criticised by the mathematical and scientific philosophers of the Seventeenth Century, like Rene Descartes, and by the Protestant Reformation.

Aquinas was also familiar with Arabic philosophy, and disagreed with European followers of Ibn Roshd, who were referred to as the *Latin Averroists*. In his tract , *On the Unity of the Intellect against the Averroists* , Aquinas attacks Siger of Brabant. In the Aristotelian philosophy, that element of the soul, which is responsible for intellectual understanding, is called the Agent Intellect. Aristotle thought that the agent intellect is eternal. Ibn Roshd accepted this idea, and argued that there is only one agent intellect, which is shared by all humans. Maimonides' doctrine seems to have been similar, as he refers to the agent intellect as an angel. Siger of Brabant, however, went further and argued that the passive elements of intellection are also common to all humans. This is tantamount to monopsychism, the doctrine that there really is only one soul, in which we all share. This made Aquinas quite angry, because it seems to provide a philosophical basis for forgiving sinners too easily. For, as Latin Averroists seemed to believe, if Saint Paul's soul is saved, and if my soul is the same as that of Saint Paul, then my soul is already saved as well. So even if I sin all I like, I will get to heaven. Aquinas' *On the Unity of the Intellect* is a polemical diatribe against this doctrine. But monopsychism seems bioethically appealing nonetheless. It seems to affirm the unity and solidarity of all humans, encouraging love. And why shouldn't we welcome reasons for forgiving people? (FL)

Aquinas' Doctrine of Double Effect has had considerable influence on bioethics. It says that it is permissible to do an act which produces an unethical effect, when the act is performed with the intention of achieving another effect which itself is ethical. The unethical effect may be foreseen, but it must not be intended. Thus, priests have permitted birth control pills if the intended effect is to regulate the menstrual period, and not to prevent conception. The doctrine is used to permit giving patients high doses of opioids like morphine or heroin, even if death is a foreseen result, when what is intended is not death but relieving pain. This application of the doctrine has been hotly debated. (FL)

**ARBITRARY**: Uncertain; random; accidental; discretionary; outside of central relevance to the methodology, law or principle, therefore accepting of individual choice and subjectivity. (MP)

**ARBITRATION:** The hearing and resolution of a dispute by a person or legal body (arbitrator) chosen by the disputing parties or appointed by government statute. (See MEDIATION, NEGOTIATION, FACILITATION, DISPUTE) (MP)

**AREA OF OCCUPANCY:** See POPULATION DISTRIBUTION.

**ARETAIC ETHICS :** The principle of centrality of employing moral agents as the basis of change. (JA)

**ARISTOTLE** (c. 384-322 BC) Perhaps the most famous of Greek philosophers, he influenced Islamic, Jewish and Christian philosophy. Author of works on logic, philosophy, natural science, ethics, politics and poetics. He believed in living according to a "middle road" between extremes (an idea which is also found in Buddhist writings, leading to the question whether it began in Greece or much farther East). He thought that the most ethical life is the life of intellectual activity, in which we become most similar to and beloved by the gods. His main ethical works, the Nicomachean Ethics and the Politics, were the crowning finale to a massive corpus including logic, scientific method, philosophy of mathematics, physics, biology and metaphysics. This raises the question whether today's specialized BA, MA and PhD programmes in ethics are the best way to educate bioethicists. Perhaps they should start with more science and substantive philosophy, like Aristotle.

Aristotle said that it is a mark of maturity not to seek more precision than one's subject can allow, and that ethics -- more of an art than a science -- is incapable of the degree of precision which mathematics and physics allow. This implies harsh criticism for philosophers like the utilitarian, Bentham, who sought an ethical calculus which would give definitive answers to questions, as well as for those who try to quantify ethics through statistical surveys. (FL)

**ARITHMETIC :** The study and the understanding of the structure of the number system and the skills necessary to manipulate numbers in order to solve problems. Numbers may be manipulated to advantage from one form to another, for example, fractions to decimals. (See ALGEBRA, ANALYSIS OF VARIANCE, SCIENTIFIC METHOD, STATISTIC). (IP)

**ART** see also ASSISTED REPRODUCTIVE TECHNOLOGY

**ARTHROPODA :** Name of a phylum in the animal kingdom. Animals (arthropods) that have jointed appendages. E.g. Fly, Crabs, Millipedes, Scorpions etc. (JA)

**ARTIFICIAL:** Created, produced or imitated by humans. Not occurring in nature, or not the genuine article. Artificial creations such as new chemical products, newly designed drugs or genetically modified organisms may have unpredictable effects on biological or ecological systems, as they have not been tested by any previous evolutionary process. (See ARTIFICIAL LIFE, GENETIC ENGINEERING) (MP)

**ARTIFICIAL FEEDING :** Feeding other than by mouth. The terms, Enteral feeding, Parenteral feeding, and Tube feeding are used . (DM)

**ARTIFICIAL HABITAT:** 'Artificial habitat' is sometimes used in an extreme envich included humansearch on the safety of artificial habitats will be required before colonization of the moon becomes realistic. (See HABITAT, BIOSPHERE 2 PROJECT, INTERNATIONAL SPACE STATION) (MP)

**ARTIFICIAL HYMEN:** a synthetic membrane that is stitched in place to seal the vagina before the marriage ceremony. The operation is practiced in cultures where virginity (virtue) at marriage is regarded as desirable or even mandatory. (IP)

**ARTIFICIAL INSEMINATION:** The introduction of sperm into a woman's vagina or uterus by noncoital methods, for the purpose of conception. The procedure is done either with semen from an anonymous donor (artificial insemination by donor or AID) or from semen provided by the partner or husband (artificial insemination by husband AIH). AID is recommended when the partner is infertile or in cases in which he is a carrier of a serious genetic defect. Assuming normal fertility in the female, tested donor semen results in a pregnancy in 70% of the cases and is, therefore, one of the major treatments for male infertility. The procedure does not carry an increased risk of spontaneous abortion or congenital anomalies. AIH has a much lower success rate but is useful in cases of paraplegia (sperm is collected by electroejaculation), obstructed vas deferens or epididymis (sperm is aspirated from the epididymis) and forced separation of couples (prisoners on long-term sentences). AI as a technique has been practiced for centuries as a tool in livestock production and its application has been broadened to include conservation programs for endangered species. The first recorded human birth after AIH was in 1790 when the Scottish physician John Hunter inseminated a woman with epididymal sperm from her husband who had urethral defect (see artificial insemination by husband, ASSISTED REPRODUCTIVE TECHNOLOGY). (IP, DM)

**ARTIFICIAL INSEMINATION BY HUSBAND :** The procedure is used in cases of paraplegia, obstructed vas deferens or epididymis and forced separation. It is also used widely for idiopathic (cause unknown) infertility. Between 15-30% of women become pregnant during six insemination (menstrual) treatment cycles, significantly less successful compared with donor insemination purporting a reported 60% birth rate after six insemination cycles. (See ARTIFICIAL INSEMINATION, DONOR INSEMINATION). (DM+IP)

**ARTIFICIAL LANGUAGES:** Many 'artificial' or 'auxiliary' languages have been invented and used to facilitate international communication and understanding. These have included Volapük ('World language' 1880), Esperanto ('Lingvo Internacia' 1887), Idiom Neu986). Natural languages have been modified or simplified, for example Latino Sine Flexione (Latin without inflections) and BASIC English ('British American Scientific International Commercial English') with its selective 850 word vocabulary. Other languages have evolved (e.g. slang and jargon), merged (e.g. pidgins and creoles), been developed by necessity (e.g. sign language and shorthand) or for specialized purposes such as computer programming (e.g. Basic, Pascal and Java). Other artificial languages are just plain fun, for example Solresol ('Langue Musicale Universelle'), whose syllables are based on the musical tones such that it can be spoken, sung or played. (See ESPERANTO, PIDGIN, LINGUISTICS, SEMIOTICS, MULTIMODAL COMMUNICATION, TRANSLATION SOFTWARE) (MP)

**ARTIFICIAL INTELLIGENCE:** Artificial Intelligence (AI) is the computer modeling and software simulation of human intelligence and other mental processes. Such intelligence would include holding a conversation, problem-solving, thought processing, object manipulation, playing chess, writing stories, translating, speech recognition, pattern recognition (vision), interactivity and learning. Current commercial AI has been slow to match the science fiction dreamers in simulating human mental functions. However, the evolution of technology is accelerating and tends to progress in sudden surges. 'Expert Systems' and 'Decision-Support Systems' are the practical application of AI research. They are used for solving problems and making decisions in a particular domain, for example 'Cyc' is inn of AI. Bionics, cybernetics and the cyborg are medical applications of AI. Combination of all these technological features of intelligence is called the 'top-down' approach to AI, whereas the 'bottom-up' approach is the endowment of 'Artificial Life' with the powers of replication, adaptation, learning and self-evolution. Popular science fiction such as Hollywood's *Matrix* have presented the possibility of the human species being superseded by the evolution of artificial intelligence. Despite skepticism, scientific risk-analysis and ethical debate is required because of the extreme



consequences to humanity from such a scenario. Scientific and philosophical debate has not been able to rule out the possibility of silicon-based life - works such as *The Emperor's New Mind* by Roger Penrose which have tried to refute the possibility have had their assumptions criticized. It seems that certain thresholds or previous limits to the creation of artificial intelligence are likely to be breached by advances in quantum computing, nanotechnology and/or molecular electronics. These advances combine immense increases in processing power with the replication and manipulation of molecules and atoms, and add carbon (organic molecules) to the traditional silicon of microcircuits. Whether or not all definitional requirements for 'life' or 'intelligence' are met, something much *like* these things is on the technological horizon. Even today, non-sentient information databases and other computerized technology are taking over our daily transactions – whether individually (automated workplace, privacy, 'Big Brother') or collectively (over-reliance on technology). (See ARTIFICIAL LIFE, EXPERT SYSTEM, ROBOTICS, ROBOT ETHICS, INTELLIGENCE, CYBORG, BIONICS, BIG BROTHER, DEEP BLUE, TURING TEST) (MP)

**ARTIFICIAL LIFE:** Software and hardware which has similar characteristics to living organisms. The 'top-down' approach out to be quite cute, for example the camera and gyroscope-faced 'Cog' and 'Kismet', or the insect-like heat-sensing six-legged 'Genghis'... but endowed with artificial intelligence in a terrain of unmanned vehicles and autonomous weapons it is a different story. The opposing mode of research into artificial life is the 'bottom-up' approach, which allows artificial life to *create itself* through the powers of evolution. Using nature as the model, programs such as 'genetic algorithms' and 'cellular automata' are created with. Examples of ear internet, with iintranets and firilar electronics atween natural selection in organisms/cells and that of cellular automata is that biological evolution selects among *random* variations, whereas variation in artificial life may be heuristically *directed*. The potential ethical danger from this is that artificial life can evolve at an incredibly greater speed than any biological system. The internet provides a very difficult-to-control habitat with a rich informational database, and could perhaps eventually support a very diverse form of cyber-ecology or central intelligence. (See LIFE, ARTIFICIAL INTELLIGENCE, INTELLIGENT AGENT, CELLULAR AUTOMATA, COMPUTER VIRUS, WORM, ROBOTICS, ROBOT BUSH) (MP)

**ARTIFICIAL NEURAL NETWORKS:** Computational models which emulate biological neural networks. Artificial neural networks contain components and functions analogous to neurons, for example the processing element (nucleus), network node (soma), inputs (dendrites), output (axon) and signal weight (synapse), though without all of the layers of complexity of biology. Artificial neural networks are associative memory systems using inductive reasoning, self-organization and parallel processing similar to the human brain. They are driven by data, and function by scanning many case studies for common patterns. They can function despite the presence of ambiguity by using induction, associative memory or fuzzy logic. (See NEURAL COMPUTING, NEURAL NETWORKS, SWARM INTELLIGENCE, GENETIC ALGORITHMS, SMART DUST) (MP)

**ARTIFICIAL ORGANS :** Medical devices used as replacement for body tissues. (See ORGAN TRANSPLANTS) (DM)

**ASBESTOSIS:** See SILICOSIS.

**ASCORBIC ACID:** See VITAMIN C.

**ASEAN:** Association of South East Asian Nations.

**ASEXUAL REPRODUCTION:** Reproduction of organisms by purely vegetative means without the function and interaction of the two sexes. Examples of commonly asexually reproduced plants are roses, peach trees, and lilies. All plants can produce vegetatively, but many

normally use sexual reproduction. (DM+IP)

**ASHKENAZI JEWS** : "Ashkenaz" means Germany in Hebrew and "Sefarad" means Spain. In popular language Ashkenazi Jews are those whose ancestors lived during the exile in Northern Europe, while -- because many Spanish Jews fled eastward after the expulsion of the Jews from Spain in 1492, Sefaradi Jews are thought of as those from North Africa and the Middle East. But this is a misconception because many Spanish Jews fled to Northern Europe after the expulsion, and many so-called Ashkenazi Jews are descended from them. Also, many North African and Middle Eastern Jews are descended from families who were never in Spain. These include most notably the "Bavlim" (Babylonians) who were in Iraq since Biblical times, the Yemenites, who were in Yemen since Biblical times or shortly thereafter, and Israeli families who have been in Israel continuously since Biblical times. There are also communities who were never either in Europe or the Middle East before they immigrated to Israel. These include the Ethiopian community, and the Kochanim (from Kerala in Southwest India) who were in their exilic homelands at least since the time of the Second Temple.

Ashkenazi Jews are often mentioned in genetic medicine because of a number of genetic diseases -- notably Gaucher, Tay-Sachs and breast cancers -- which occur particularly frequently in this population, and have attracted much research interest. (FL)

**ASOCIAL**: Asocial behavior refers to withdrawal from society, including inhibition, inconsideration and avoidance of others. It may often be accompanied by anxiety and depression. (See ANTISOCIAL) (MP)

**ASPHYXIA**: (Greek: *a* + *sphysis* 'without pulse') Severe reduction of oxygen in the blood resulting in loss of consciousness and, if not reversed, death. Causes can be varied; for example, drowning, inhalation of toxic gas or smoke, poisoning and blockage of respiratory tract. The condition is of specific concern in some newborns where it may develop during labor or immediately after delivery due to, for example, prematurity or the effects of anesthetics and analgesics (Greek *a* + *sphysis* without pulse) (see INTRAUTERINE GROWTH RETARDATION and HYPOXIA). (IP)

**ASPHYXIATION** : (Greek *a* 'without' + *sphysis* pulse). Suspension of breathing due to an abnormally low oxygen concentration in the lungs. The condition may be brought about by a) obstruction to the passage of air to and from the lungs as in drowning, presence of foreign bodies/malignant growths in the air passages, b) insufficient oxygen supply in the air, c) poisonous (asphyxiant) chemical substances causing suffocation. Whatever the cause severe hypoxia, if not corrected quickly, leads to hypoxia risking brain damage, irreversible paralysis and ultimately death. (See HYPOXIA). (IP)

**ASPIRIN** : Acetylsalicylic acid (C<sub>9</sub>H<sub>8</sub>O<sub>4</sub>) probably the most widely used over-the-counter analgesic bought for headache, dental pain and symptomatic relief in flu. It has been the mainstay of pain relief for 100 years but despite this its mechanism of action is not fully understood, however, it seems to reduce pain by acting on blood platelets which are involved in the process of inflammation. For this reason aspirin is also a mainstay in arthritis and is valuable in forestalling heart attacks; however, it does not offer heart-attack protection. Aspirin is the standard against which other non-steroidal anti-inflammatory drugs are measured. It is important to take the medication with food to prevent gastrointestinal irritation. (See ANALGESIC; CORTICOSTEROIDS). (IP)

**ASSASSINATION**: (Assassin from Arabic *hashshashin* 'hash eaters') The surprise murder of a prominent political or public figure for the purposes of making a statement or otherwise changing the course of human events. Rightly branded as terrorism during times of peace, assassination may become common practice during times of war. National non-assassination policies should be encouraged, especially in Western democracies. International systems of justice and intervention should be empowered to provide just and legal alternative means. (MP)

**ASSISTED REPRODUCTIVE TECHNOLOGY (ART):** Infertility treatment where "assisted" means "technologically assisted" which include Ovulation Induction, Artificial Insemination (AI), *In Vitro* Fertilization (IVF) and subsequent Embryo Transfer (ET), Gamete IntraFallopian transfer (GIFT), sperm microinjection techniques such as IntraCytoplasmic Sperm Injection (ICSI), Fallopian tube transfer of ICSI eggs (FICIT), Cytoplasmic Transfer, frozen preservation and storage (Cryopreservation) of sperm, eggs and embryos and their subsequent thawing and transfer as in Frozen Embryo Transfer (FET), the use of donated sperm, eggs and embryos (Tissue Banking), Surrogacy, and any other form of medical or surgical treatment that may be used to assist in establishing and/or maintaining a pregnancy. Cloning technology is not medically available (see separate entry for each technology). (See Individual entries) (IP)

**ASSISTED SUICIDE :** Provision of information and/or the means to enable a patient to take his or her own life. (See also EUTHANASIA). (DM)

**ASSUMPTION:** 1. An axiom or statement, not necessarily true but put forward and taken to be true to enable further analysis of a hypothesis, or for the purposes of investigating what follows in relation to a theory. 2. A presupposition, or the basis of an assertion, required to be true for the assertion to be true. Assumptions are often unstated or even unknown, but implied by the associated theory or argument. Almost all thought processes and knowledge are based upon some assumptions. (See AXIOM, THEORY, HYPOTHESIS, CONJECTURE, PREMISES) (MP)

**ASTHMA :** Asthma, or a pathological shortness of breath, can be treated by various drugs. MAIMONIDES(q.v.) in his medieval Treatise on Asthma, maintained that it can be treated psychosomatically, by calming the mind. One of the authors of this dictionary has cured himself of an addiction to an asthma inhalator of over twenty years, by combining breathing from Yoga and from Japanese martial arts. He inhales through the mouth, for a count of seven, drawing the air down to the "tanden", which is the centre point between the naval and the pubic bone, and allowing the air to expand the lower abdomen. Then, without releasing any air, he switches to breathing in through the nose, again for a count of seven, but this time expanding the chest and (imagining the chest to be open at the bottom like an upturned barrel) drawing air up from the tanden into the upper chest. He then holds his breath for a count of seven, and then while counting again to seven, releases it through the nose. He does this exercise while standing and raising his arms higher, and higher, in order to open the chest as much as possible. He also does it while sitting in Japanese "seiza" position, either raising the arms, or simply letting them rest on his lap. This method has not yet undergone controlled clinical trial. ( See CORTISOL). (FL)

**ASTROBIOLOGY:** Astrobiology and exobiology are the study of and search for potential life or biological activity outside the boundaries of the planet's biosphere; its possible characteristics, location, likelihood and relevance to the origins of life on Earth itself. (See ALIEN LIFE, ORIGIN OF LIFE) (MP)

**ASTRONAUT:** The astronaut or cosmonaut is an intrepid human visitor outside of the Earth's atmosphere into space. (See SPACE EXPLORATION, EARTH FROM SPACE) (MP)

**ASTROLOGY** Art or science of determining the purported influence of the stars and other heavenly bodies on human affairs. (MR)

**ASTRONOMICAL UNIT:** A unit of distance in space, defined as the mean distance from the center of the Earth to that of the Sun, or about 149.6 million kilometers. (See LIGHT YEAR) (MP)

**ASTRONOMY:** The science of the stars and space. Astronomy includes the universe as a whole (cosmology), its component matter, energy and interactions (astrophysics) and often the philosophical theory beyond the math (metaphysics). (See COSMOLOGY, ASTROPHYSICS, ASTROBIOLOGY, METAPHYSICS) (MP)

**ASTROPHYSICS:** The physics, chemistry, mathematics and metaphysics of the stars and the universe. (See COSMOLOGY, ASTRONOMY) (MP)

**ASYLUM:** 1. a place of sanctuary, a refuge (see women's shelter) 2. A place used for the detention and treatment of the mentally ill (see insanity). (IP)

**ATHEIST :** Someone who does not believe in the existence of God. (DM)

**ATMOSPHERE:** The envelope of gases and particles surrounding the Earth, within which are maintained homeostatic conditions for life. Environmental indicators for the atmosphere usually concern air quality or climate. The troposphere is the lower atmosphere up to about 20km, in which minor gases, particles, water vapour and carbon dioxide have a significant effect and where most weather takes place. The stratosphere is from about 20-50km and contains much of the ozone layer. Above that are the mesosphere and thermosphere before the vacuum of space. (See GLOBAL WARMING, GREENHOUSE EFFECT) (MP)

**ATMOSPHERIC POLLUTION :** See AIR POLLUTION.

**ATOM:** The atom is the building block of matter. An atom is composed of positive protons and non-charged neutrons in its nucleus, surrounded by shields of negative electrons. All atoms of an element are different from the atoms of another element. The atomic number of an element is its positive charge - the number of protons in its atoms. The protons and neutrons are composed of different types of quarks. Atoms can emit energy and radiation. (See ATOM BOMB, ELEMENT, QUARK) (MP)

**ATOM BOMB :** Bomb in which the explosive power, measured in terms of equivalent TNT, is provided by the nuclear fission of material such as <sup>135</sup> Uranium or <sup>239</sup> Plutonium. The bombs dropped on Hiroshima and Nagasaki was of this type. The most tragic moment in human history was fifteen minutes past eight on the morning of August 6, 1945 when the first atom bomb ever was dropped on the earth and exploded above Hiroshima city. That one explosion reduced the entire city to ashes and 247,000 lives were instantly wiped out. Gamma rays and neutrons produced by atomic explosions penetrate deeply into animal tissues causing immediate death or delayed effects, known as radiation sickness, observed as internal bleeding, vomiting, diarrhea and skin lesions which may become evident months after exposure. Moreover, the offspring of those exposed to radiation may be affected by harmful mutations that can reappear in future generations. The post-war Japanese constitution completely renounces war and advocates permanent peace for the world something that had never been done before in the history of humankind. The Japanese people accepted the Potsdam Declaration in a spirit of repentance for the destruction and misery inflicted upon a large number of human beings by the militaristic Japan of the war years. (See HYDROGEN BOMB; NUCLEAR WINTER; NUCLEAR FISSION; NUCLEAR FUSION; NEUTRON BOMB, PLUTONIUM). (IP)

**ATOMIC POWER:** Using the energy that is created when an atom is divided, especially for electricity production. (DM)

**ATTENTION-DEFICIT HYPERACTIVITY DISORDER (ADHD):** is the latest term designating a chronic disorder that begins early in childhood and is manifested by problems of awareness, difficulty with attention, excessive motor activity (hyperactivity) and poor impulse control (impulsiveness). It is among the most common causes of behavioral disturbances, estimated to affect 3-5% of school-age children with

highest risk in boys. Symptoms associated with ADHD (although not called this at the time) were first described in 1902 by British pediatrician George Still. Still, correctly, suggested that behaviors he had observed amongst certain children in his practice were not caused by bad parenting but a subtle unidentified brain injury. Recent evidence points to a brain-based biological disorder where a possible genetic predisposition is activated by stressful environmental factors. Environmental factors such as hypoxia, pre-, peri- and postnatal trauma have been implicated, as has exposure to toxic substances such as alcohol, cocaine, nicotine, marijuana and lead. ADHD individuals have lower than normal levels of selected neurotransmitters, dopamine in particular, which means that the brain will metabolize more slowly. (See BRAIN NEUROTRANSMITTERS, RITALIN HYDROCHLORIDE). (IP)

**AUGUSTINE: (354-430, Numidia), also called *Saint Augustine of Hippo*, original Latin name was *Aurelius Augustinus*.** Was one of the Latin Fathers of the Catholic Church, one of the Doctors of the Church, and is considered by many as the most significant Christian thinker after St. Paul. **Augustine** 's adaptation of classical thought to Christian teaching created a theological system of great power and lasting influence. His numerous written works, the most important of which are *Confessions* and *City of God* , shaped the practice of biblical exegesis and helped lay the foundation for much of medieval and modern Christian thought. More than five million words of his writings survive. He adapted Platonic tradition to Christian concepts. (DM)

**AUNG SAN SUU KYI :** See SUU KYI, AUNG SAN.

**AURA:** An aura is a kind of light which seems to surround human beings. It may also surround animals, plants and even inanimate objects. Kirlian photography, invented in Russia, seems to be a method to photograph auras. People may have varying degrees of ability to see auras, or to read their meanings. The *halo*, seen in Christian and Buddhist religious paintings, seems to have been an aura, representing the strong light which highly spiritual people seem to project. The *lehat*, or light surrounding the sword which protected the Biblical Garden of Eden (Genesis III, 24) may also have been an aura.

Some methods of spiritual healing are said to work by way of the aura. In *Rei-Ki* healing, the healer massages the aura more than the body. Sometimes one can get a feeling for the aura with no need to touch the person's body, although it is often necessary to begin by touching the various points on the body, either through clothing or directly, in order to get a feeling for the aura. Special *Rei-Ki* training is usually needed, to acquire this ability. Some trained *Rei-Ki* people can feel the aura more strongly than they can see it. (See Haloes ) (FL)

**AUSCHWITZ :** In Polish *Oświęcim* , also called Auschwitz-Birkenau. Nazi Germany's largest concentration camp included a prison, an extermination camp, and a slave-labour camp. Auschwitz has become the symbolic site of the “final solution,” a virtual synonym for the Holocaust. Newly arrived prisoners at the death camp were divided in a process known as *Selektion* . The young and the able-bodied were sent to work. Young children and their mothers and the old and infirm were sent directly to the gas chambers. Thousands of prisoners were also selected by the camp doctor, Josef MENGELE, for medical experiments. Auschwitz doctors tested methods of sterilization on the prisoners using massive doses of radiation, uterine injections, and other barbaric procedures. Experiments involving the killing of twins, upon whom autopsies were performed, were meant to provide information that would supposedly lead to the rapid expansion of the “Aryan race.” Subject to harsh conditions—including inadequate shelter and sanitation—given minimal food, and worked to exhaustion at Auschwitz. Between 1.1

and 1.5 million people died at Auschwitz; 90 percent of them were Jews. Also among the dead were gypsies .Auschwitz was designated a UNESCO World Heritage Site in 1979. (DM)

**AUSTIN, J:** See ANALYTIC PHILOSOPHY.

**AUSTRALASIA :** The land masses of Oceania in the South Pacific together with Australia, New Zealand, New Guinea and associated islands (Latin *australis* = southern + Asia). (IP)

**AUSTRALIAN ABORIGINAL:** The indigenous Australians believe that they have been in Australia since the Dreamtime or Creation.

Although their origin is still unsubstantiated scientifically, it is hypothesized that they migrated from the South East Asian region more than 50,000 years ago when the sea was at its lowest levels and more exposed land enabled such a crossing (see GONDWANA).

Among Australia's indigenous peoples many cultures exist and Aboriginal people identify as both indigenous and, whenever possible, also as a member of their language group; that is, coming from a particular place/country each identifiable by its own creation stories (see Dreamtime and Dreaming). It is estimated that at the time of invasion (Captain Phillips's landing at Botany Bay, Sydney, in 1788) there was a population of about 3 million Aboriginal peoples - each with their own country and culture. These days, over 250 languages are spoken and mostly English words and indigenous language structures; such as the creole, known as Kriol, spoken. Ensured that being identified as Aboriginal could mean further loss (see Reconciliation). Aboriginals prevented from speaking their language or practicing their culture, and their children were denied taken away from their families to be placed in institutions, or brought up by non-Aboriginal families by living a European lifestyle and agreeing not to associate with any Aboriginals, exceptions (re Aboriginal, for example, was awarded a certificate of citizenship in 1957 in recognition of his alcohol with his kin (the supply of alcohol was a criminal offense), was imprisoned and died soon after the Australian electorate, granted Aboriginal and Torres Strait Islander peoples full citizenships many of the traditional values and assumptions. (IP)

**AUSTRALOPITHECUS :** Paleoanthropological studies have identified many human like fossils and fossil humans. It is a prehuman fossil, also called The Ape Man, was located in south and East Africa, dating back to about 5 million years ago. It exhibits bipedalism, has protruding jaws and a small brain cavity. When compared to the bigger cranial cavity of Modern *Homo sapiens*. (JA)

**AUTHORITARIAN:** Demanding total obedience and refusing to allow people freedom to act as they wish. (DM)

**AUTISM :** (Greek *autos* "self") a little understood rare (4 in 10,000 live births) mental disorder first named by Leo Kanner, an American psychiatrist, in 1943. The condition is characterized by extreme social withdrawal and inability to communicate verbally or emotionally with people. Impairment of social interactions may be due to an abnormal interest in fantasy engendered by delusions and hallucinations resembling schizophrenic withdrawal in adults. The onset of this pervasive developmental disorder may be in infancy or early childhood and is characterized by internally-stimulated thinking where ideas have a private meaning and abnormal ways of relating to people, objects and situations. Recent findings suggest that organic, rather than psychological, injuries in the limbic system (the brain's emotional center) might explain some elements of autistic behavior. Although far more autistic children have sub-normal levels in IQ than would be expected from the normal continuum of all levels of intelligence, a small number possess superior intelligence and/or certain skills related to their lateral thinking or highly-focused attention on aspects of interest. The best educational approach is thought to be sympathetic but formal instruction. (IP+MP)



**AUTOGRAFT** : (Greek *autos* "self" + *graphion* "stylus") a permanent transplantation of any tissue from one site of the body to another site in the same individual. Autografting is typically used in medical surgery such as the replacement of lost skin in cases of severe burns, or in plastic surgery such as the remodeling of facial features. (See ALLOGRAFT, XENOGRAPH). (IP)

**AUTOIMMUNE DISEASE** : A disorder in which the immune system fails to recognize self and directs an immune response against its own body tissues. Among human autoimmune diseases in which components of the body are attacked by its own immune system are rheumatic fever, rheumatoid arthritis, ulcerative colitis and myasthenia gravis (muscle weakness). (IP)

**AUTOMATIC WEAPONS** : Automatic weapons enable rapid fire by using some of the explosive energy to eject the shell and automatically reload the next bullet into the chamber. An automatic weapon fires in a continuous stream for as long as the trigger is depressed. A semi-automatic weapon fires one bullet for each click of the trigger. Mobile or mounted automatic weapons of varying sizes are also known as machine guns. The smaller sub-machine gun is designed for portability and flexibility, with lightweight frame and short barrel usually firing pistol ammunition. Many non-violent countries restrict or severely regulate civilian ownership of automatic weapons. (See SMALL ARMS, AUTONOMOUS WEAPONS) (MP)

**AUTOMATON** : (Greek: *automatos* 'acting of itself') An early term for a mechanical device or simple robot able to self-perform or imitate real-life actions. Sometimes used as derogatory for a person who goes through life with a mechanically predictable and ordinary routine. Descartes argued that animals may also be mere automata, wholly governed by the laws of physics. (See ROBOT, CELLULAR AUTOMATA) (MP)

**AUTONOMIC NERVOUS SYSTEM** : The motor nerve fibers supplying the glands, organs and smooth muscles of the vertebrate body, including the sympathetic and parasympathetic nervous systems; the elements of the nervous system which automatically manage the functions of internal organs such as pulse and digestion. (See CENTRAL NERVOUS SYSTEM) (MP)

**AUTONOMOUS**: Ability to operate on one's own. (See AUTONOMY) (MP)

**AUTONOMOUS UNDERWATER VEHICLE**: See AQUABOT.

**AUTONOMOUS WEAPONS**: An ethically perilous form of missiles and other robotic weapons, endowed with onboard 'intelligence' to locate themselves, navigate and destroy the enemy without direct external guidance or tele-operation from humans. Euphemistically called 'smart' weapons, ROBOTICS, AUTOMATIC WEAPONS, MISSILES) (MP)

**AUTONOMY**: (Greek: *autos* 'self' + *nomos* 'law') The governing of one's self according to one's own system of morals and beliefs. 1. the absence of external constraint and a positive power of self-determination often applied to the right of personal freedom in actions, choices, beliefs and preferences. Bioethics uses autonomy as self rule, though the term self-love has been 2. in political philosophy the right of self-government of community, group or state, to formulate and enforce its own laws, policies and affairs; being independently accountable 3. biological organic independence evolved and controlled by natural laws and not subject to any other [Greek *autos* meaning self and *nomos* meaning law] (IP+DM)



**AUTOPSY** : Postmortem examinations.

**AUTORADIOGRAPHY**: A technique that uses X-ray film to visualize radioactively labeled molecules or fragments of molecules. For example it is used in analyzing the length and number of DNA fragments separated by electrophoresis. (DM)

**AUTOSOMAL RECESSIVE DISORDERS** : Disorders, where for a person to be affected, a mutation has to be inherited from *both* parents. Such parents are usually unaffected carriers because they only have a single copy of the mutant gene. Recessive disorders commonly have onset in childhood and include cystic fibrosis, sickle cell disease and thalassaemia. (JA)

**AUTOSOMAL DOMINANT DISORDERS** : Disorders where inheritance of a mutation from one parent only (or arising anew during egg or sperm formation) can be sufficient for the person to be affected. Dominant disorders include familial hypercholesterolaemia, Huntington's Disease, adult polycystic kidney disease and neurofibromatosis. (JA)

**AUTOSOME**: A chromosome not involved in sex determination. A chromosome other than sex chromosomes. The diploid human genome consists of 46 chromosomes, 22 pairs of autosomes and 1 pair of sex chromosomes. (DM)

**AUTOTROPHS**: (Greek *autos* 'self' + *trophe* 'food') Are self-sufficient organisms that are capable of obtaining their energy for life from exclusively inorganic materials, water, and some energy source such as sunlight (photosynthesizing plants) or capture their energy from converting inorganic chemical reactions involving iron or sulfur (autotrophic bacteria) (Greek *autos* self + *trophe* food). (Contrast

**HETEROTROPHS**) (IP)

**AUXIN** : (Greek: *auximos* 'promoting growth') A plant growth (cell elongation) regulator/hormone, used in tissue culture = indoleacetic acid (IAA). (JA)

**AVERAGE**: See MEAN.

**AVES** : (Latin: 'birds') Aves is the zoological class which comprises the birds. (See BIRDS, ORNITHOLOGY) (MP)

**AVESTA**: Most sacred text of the Zoroastrians (See ZORASTRIANISM). The earlier part of the Avesta, known as the Gathas, is a collection of short hymns. (AG)

**AVIAN** : Describing bird characteristics and bird life, an avian feature may also refer to a resemblance or relationship with the attributes of birds. (See AVES) (MP)

**AVICENNA** : See IBN SINNA.

**AWACS** : Acronym for 'Airborne Warning and Control System', AWACS perform an important defense function against missile and other military attacks. (See MISSILE DEFENCE) (MP)

**AWOL** : Military acronym for 'Absent Without Leave', although not necessarily implying intentions of desertion. (MP)

**AXIODRAMA** : (Greek: *axioma* 'hold worthy'). A method of exploring issues of ethics, cosmic relationships or values where the protagonist can review his or her relationship with God, Satan, a guiding spirit, death and so on. (See PSYCHODRAMA; ROLE PLAYING; ROLE REVERSAL). (IP)

**AXIOM**: An assumption or statement assumed true for the purposes of further analysis or deduction. (See ASSUMPTION) (MP)

**AXON** : Each nerve cell has only one axon carrying nerve impulses away from the cell. They are usually longer than the dendrites, sometimes about 100 cm long. (See DENDRITES, NEURON). (IP)

**AYURVEDA**: (lit. "knowledge of life")- A traditional Indian system of medicine and holistic healing. This system is based on the idea of balance of the elements and energies in the body, and recognises the unique constitutional aspects of each individual. The constitutional differences between individuals are expressed in the three dosas, and their combinations (see TRIDOSA). The traditional texts of Ayurveda are written in the Sanskrit language. (AG)

**AYURVEDIC MEDICINE**: Is said to be the oldest medical system on which many other oriental medical systems are based. It is practiced predominantly in India and encompasses several therapeutic modalities (e.g. herbs, massage, diet, yoga and meditation) which aim to redress homeostatic imbalances in the 3 doshas or primary life forces. An emphasis is placed on balancing the physical, spiritual and mental aspects of a person (See AYURVEDA) (JW).

## B

<a href="#">A</a>	<a href="#">B</a>	<a href="#">C</a>	<a href="#">D</a>	<a href="#">E</a>	<a href="#">F</a>	<a href="#">G</a>	<a href="#">H</a>	<a href="#">I</a>	<a href="#">J</a>	<a href="#">K</a>	<a href="#">L</a>	<a href="#">M</a>	<a href="#">N</a>	<a href="#">O</a>	<a href="#">P</a>	<a href="#">Q</a>	<a href="#">R</a>	<a href="#">S</a>	<a href="#">T</a>	<a href="#">U</a>	<a href="#">V</a>	<a href="#">W</a>	<a href="#">X</a>	<a href="#">Y</a>	<a href="#">Z</a>
<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**BACKWITH-WIEDEMANN SYNDROME** : A rare genetic disease with a predisposition to cancer of the kidney and liver before puberty, There appears to be a connection between children conceived by IVF birth technology and the genetic disorder. In USA, out of 63 children born with this disorder over 4% were IVF babies as on November 2002. Also called BW Syndrome, a genetic disorder occurring in about one in 15,000 births. Causes children to be born abnormally large, with large tongues and poor closures of the abdominal wall and are prone to hernias which needs surgical repair. (JA).

**BACON ROGER** (1214-1294) is credited with being the founder of experimental science (see SCIENTIFIC METHOD)

**BACTERIA**: (Greek: *bakterion* 'small stick') Bacteria (singular: *bacterium* ) are small (between 1 and 10 microns) single-celled microorganisms whose genetic material is not enclosed in a special nuclear membrane. For this reason, bacteria are called procaryotes, from the Greek meaning prenucleus. Bacterial cells generally appear in one of several shapes; bacillus (rodlike), coccus (spherical or ovoid) spiral (corkscrew) or vibrios (comma-shaped) being the most common shapes. Individual bacteria may form pairs, chains, clusters, or other groupings and generally reproduce by a process called binary fission; that is, dividing into two equal daughter cells. For nutrition, most

bacteria use organic chemicals, which in nature is derived from either dead or living organisms, however, some can manufacture their own food by photosynthesis and others from inorganic substances. Life on Earth as we know it would not exist if it were not for microorganisms because the microorganisms, bacteria mostly, play a key role in recycling essential nutrients when they decompose organic waste and dead plants and animals. Only a minority of all bacteria is pathogenic causing disease, while the vast majority benefit humans, other animals and plants (Greek *bakterion* meaning small stick) (see BIOGEOCHEMICAL CYCLE; MICROBIAL ECOLOGY; MICROORGANISMS). (IP, JA, DM)

**BACTERICIDAL** : Killing of bacterial using sterilization methods (JA)

**BACTERIOPHAGE**: Modified bacteriophages, like the phage lambda, are used as vectors to clone genomic DNA from different sources (i.e., mammalian DNA) in their natural hosts ( E. Coli, also modified), and construct genomic libraries. (GK)

**BACTERIOSTASIS** : The inhibition of the growth and reproduction of bacteria without killing them. (JA)

**BACULOVIRUS**: A virus whose host is a bacterial cell; also called phage. As an insect virus it has a very large DNA (100-150 kb). Has been used to make DNA cloning vectors. It has been used as a viral insecticide and it is not pathogenic to vertebrates. (DM, JA)

**BAHA'I** : Religion established by Baha'ullah (Mirza Husayn-Ali Nuri) (1817-1892). This teaching places special emphasis on development of agriculture, the arts, sciences, and development of a universal language. (AG)

**BALANCE** : 1. A point of equilibrium between opposing forces; a stability, harmony, compromise or relational assessment, as in the 'balance of power' or 'balance of nature'. A balance must be maintained between ethics and technology, between ecology and economy, and between health and the pursuit of happiness. (See EQUILIBRIUM, MIDDLE PATH, BALANCE OF POWER, BALANCE OF NATURE) 2. One of the biological functions of the ear, balance is the maintenance of effective posture and locomotion with reference to an animal's weight distribution and gravity. (See HEARING) (MP)

**BALANCE OF NATURE** : The fluctuating equilibrium of natural ecological systems, in which proportions of different species are kept in balance by competition, adaptation, predator/prey relationships and symbiosis. It refers to natural ecosystems, communities and the biosphere in general where populations of all appear to be held roughly in equilibrium, and that disturbance of this harmony between organisms and the physical environment will have inevitable and generally unfavorable consequences for humankind. The phrase emphasizes the natural state as being one of balance which should be considered a critical bioethical concept (see also density-dependence). (See BALANCE, EQUILIBRIUM, NATURAL SELECTION, SYMBIOSIS, Density-Dependence ) (MP+IP)

**BALANCE OF POWER** : The distribution of might and influence between nations or other competitive entities such that one cannot completely dominate the interests of the other. (See ARMS RACE) (MP)

**BALANCING FEEDBACK**: See FEEDBACK.

**BALLISTICS**: Science of the motion of projectiles such as bullets and missiles, and more broadly also weapon physics such as explosive power (contained in the bullet not the gun), firing cap, firing pin, chamber, cartridge, shell, automatic/semi-automatic, trajectory, impact pattern etc. (See MISSILES, EXPLOSIVES) (MP)

**BAR CHART** : A graph consisting of bars whose lengths are proportional to quantities in a set of data; for example, a bar chart may illustrate how one variable such as height correspondingly increases with another linked biological variable such as concentration of a particular hormone. (See GRAPH, HISTOGRAM). (IP)

**BASE PAIR**: Two nucleotides (adenosine and thymidine, or guanosine and cytidine) held together by the bonds between individual bases. (DM+GK)

**BASEL CONVENTION** : Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989). (MP)

**BASELINE MONITORING**: An environmental or community study which provides baseline information on its condition at a point in time, for example a biodiversity inventory, against which future changes or developmental impacts can be measured. (See MONITORING, SCOPING) (MP)

**BASQUE**: Ethnic group in Europe, concentrated mainly in the Pyrenees. There are several million Basque in Europe, and a smaller population elsewhere, including in the United States. Their language is unrelated to any other European language, and it is even difficult to link their language with any outside of Europe. In their own language, the Basques refer to themselves as Euskadi. Famous Basques include St. Ignatius of Loyola, St. Francis Xavier, and the sculptor Eduardo Chillida. (AG)

**BATES, WILLIAM H.** (1860-1931) American ophthalmologist. In 1919 he published a book called "Better Eyesight without Glasses", which has been reprinted many times. He has been much maligned by ophthalmologists, although it is difficult to find any scientific refutation of his doctrines in the medical literature. He has also been misrepresented by commercializers who pretend to teach the "Bates Method", but then teach eye exercises unrelated to the advice given in Bates' own book. Bates believed that vision problems are not a disease of the eye but a disease of the mind. The ability to see clearly is a function of the ability to imagine clearly. And -- since tension is an obstacle to good vision -- the first step is to stop caring so much whether you see clearly or not, and just relax. This latter advice resembles an attitude cultivated by Zen archers and other Japanese martial artists, although Bates did not mention these disciplines in his book. Anecdotaly, some people report high success with Bates' method and others report that they cannot understand what he is trying to say. No controlled clinical trial has been reported to date. (FL)

**BATTERY FARMING** Form of FACTORY FARMING (q.v.) in which poultry (usually chickens) are kept in confinement at very high population densities for the production of eggs or meat. (MR)

**BAYESIAN ANALYSIS**: Problem analysis for decision-making in which semi-subjective probabilities are assigned to uncertainties so that they can be analyzed as risk and refined with experience. (See RISK ANALYSIS, UNCERTAINTY) (MP)

**BCG VACCINE** : Bacillus Calmette-Guerin Vaccine, an attenuated strain of *Mycobacterium bovis* used to immunize against tuberculosis. (JA)

**BEAUVOIR, SIMONE DE** : (1908-1986). French writer, feminist, philosopher, leader of the post-war existentialist movement and early exponent of women's rights. In the 1940s de Beauvoir with Sartre formulated the principles of a modern existentialist philosophy that stressed the importance of personal experience in a largely meaningless world. According to these principles, people need to create their own ethical

values and be responsible for their own actions. Many of her novels reflect this view - most notably *'The Blood of Others'* 1948; *'All Men are Mortal'* 1955; *'The Woman Destroyed'* 1968. A long commitment to improving the status of women gave rise in 1949 to her immeasurably popular and controversial book *'The Second Sex'*. *'The Second Sex'* traces women's oppression by male-dominated society and effectively argues that women's inferior social position does not reflect biology but systematic political subjugation. Simone de Beauvoir's 'ovarian' work had a profound influence on the Women's Liberation Movement of the 1960s and influenced later feminist writers. (See DWORKIN, ANDREA, GREER, GERMAINE). (IP)

**BECQUEREL ANTOINE, HENRI** : See CURIE, PIERRE.

**BEFORE/AFTER CONTROL/IMPACT METHODS**: See ENVIRONMENTAL IMPACT ASSESSMENT.

**BEGINNING OF LIFE** : The time at which human individuality or personhood is considered to begin. In biological discussions it is also used to refer to the first living organisms to appear on the planet Earth (See EVOLUTION). (DM)

**BEHAVIOR** : (Middle English *behaven* "to hold oneself in a certain way"). 1. the activity or pattern of activities of a particular organism 2. the actions, reactions and activities of individuals under specific circumstances. Behavior is the outward expression of a complex interweaving of psychological, biological and social factors determined by each individual's pattern of feelings and emotions. Healthy individuals with an inner sense of wellbeing are generally able to function adaptively in flexibility according to the needs of the situation in order to balance behavior for self-expression with responsibilities to others as they represent the continuum of genetically determined and learned characteristics. Typically, every person has a fairly typical mix of tending to be anxious, compulsive, depressed, passive, dependent, withdrawn and so on. Under stress, these particular individual's usual traits. (See BEHAVIORAL CONTROL, EMOTIONAL INTELLIGENCE). (IP)

**BEHAVIOUR CONTROL** : Manipulation of the actions of a person or group by biomedical, psychological, or social means. (DM)

**BEHAVIOR DISORDERS** : See MENTAL DISORDERS.

**BEHAVIOURAL ECOLOGY** : the branch of evolutionary ecology concerned with tracing the link between ecological factors and adaptive behavior in animals (see HUMAN BEHAVIORAL ECOLOGY). (IP)

**BEHAVIORAL GENETICS** : The study of the effects of heredity on human behavior. (DM)

**BEHAVIORAL SCIENCE** : The science concerned with the actions or activities of any individual or species as matters of biological or psychological study. (See BEHAVIOR). (IP)

**BEHAVIOUROME** : A project proposed in 2002 by Darryl Macer to map the totality of ideas human beings can have, relating to moral decision making. This includes to compare the similarities and differences between individuals and cultures. After seeing patterns in cultural diversity, from those patterns a classification system for human ideas will emerge. In the end, we could understand the mind in the way that we are beginning to understand the body. See home page and yahoo groups, <http://eubios.info/menmap.htm> (DM)

**BELIEF**: Agreement with a given world view. E.g. Belief in the existence of God. (JA)

**BELL CURVE**: The title of a controversial book that claimed race was linked to IQ; Herrnstein, Richard J. and Murray, Charles. *The Bell Curve: Intelligence and Class Structure in American Life*, The Free Press 1994, 845 pp. (See NORMAL DISTRIBUTION) (DM)

**BENEFICENCE:** The state of doing or producing good, compare to nonmaleficence. 1. in ethical theory doing and loving good, active kindness deed or work for others, bioethics = loving good 2. in science the obligation to maximize possible benefits and minimize possible harms, reflecting on social and cultural implications [Latin " *beneficium* " meaning to gain prosperously as in benefit or blessing especially from God as in benediction] (IP+DM)

**BENEVOLENCE:** (Latin: *bene volentem* 'well wish') The desire that others should be free from suffering and pain. 1. desire to do good 2. theological virtuous disposition charitable, cultural differences in emphasis on moral importance of an action and the virtue from which it is undertaken - family emphasis on benevolence, amongst strangers act with beneficence. (JA+IP)

**BENEVOLENT DICTATORSHIP:** See BENEVOLENCE, DICTATORSHIP, POWER.

**BENTHAM, JEREMY:** (1748-1832) One of the founders of the Utilitarian movement in philosophical ethics. He tried to put ethics on a scientific foundation by interpreting good and pleasure, and evil as pain, and by proposing as calculus of pleasures and pains which would give a scientific measure of the rightness or wrongness of the action. Although a seminal thinker, his follower, John Stuart Mill (q.v.) is probably better known today. (FL)

**BENTHOS:** 1. Benthos is the bed or bottom of a body of water, including the layers of mud, silt or sand. 2. Benthos (or benthon; benthic organisms) are the animals and plants which live on the seabed or lake bottom. (See ESTUARY, SEAGRASS) (MP)

**BEQUEST VALUE:** Placing value on the existence of nature and resources, including willingness to pay for their preservation for the potential future benefit to one's descendents. Bequest value is concerned with providing fair intergenerational access to nature's useful potential and life support systems. (See INTRINSIC VALUE OF NATURE, INSTRUMENTAL VALUE OF NATURE, EXISTENCE VALUE, OPTION VALUE, USE VALUE, ENVIRONMENTAL VALUATION) (MP)

**BERKELEY, GEORGE :** ( 1685-1753) Irish Bishop and philosopher. Berkeley, California, is named for him because of his prophetic poem about the course of British Empire moving westward.. He argued that matter doesn't exist. What we call material objects are really collections of sense perceptions -- colours, sounds, smells, tastes and tactile sensations -- which he called "ideas", and which he believed exist only in the mind. He was therefore the father both of radical Empiricism and of the Logical Positivist school in philosophy of science. He believed that we get our sense experiences directly from God, who needs no such intermediaries as material objects, and who gives us experiences not to teach us about a material world but to teach us moral lessons. (FL)

**BEST AVAILABLE INFORMATION:** Information required for best decision-making and problem solving includes the following: meta-analysis; assessment of context and content; a variety of data, information, models and assumptions; combination of experimental, theoretical and philosophical resources; study of appropriate systems, processes, flows, component dynamics, emergent properties, uncertainties; understands human needs and motivations; uses integrated, strategic, precautionary and adaptive management; based on the principles of sustainability and bioethics; ecological, economic, social and cultural considerations; appropriate selection of indicators; evidence based management; environmental monitoring; adherence to the principles of science, logic and ethics. (See BEST CURRENT PRACTICE, NEWLY EMERGED PROBLEM, META-KNOWLEDGE, ADAPTIVE MANAGEMENT, INDICATOR, PRECAUTIONARY PRINCIPLE,

**UNCERTAINTY) (MP)**

**BEST CURRENT PRACTICE:** Awareness of the status of knowledge and technological change across the world in relation to advancements in environmental management or medical technology. Note that best current practice is often not *most* current practice. (See **BEST AVAILABLE INFORMATION, STRATEGIC MANAGEMENT, INTEGRATED MANAGEMENT, SUSTAINABLE MANAGEMENT) (MP)**

**BHAGAVAD-GITA** The Gita is one of the principal scriptures of Hinduism, the oldest of the great, formal religions of the world. It has a deep philosophical structure projecting the essence of the Vedas, the cornerstones of Hindu orthodox tradition, interlaced in the dramatic background of the ancient great battle, the Mahabharata. While the latter is composed by the sage-author Vedvyasa, the origin of the Gita is attributed to Krishna, a major player in the Mahabharata, and believed to be one of the few great avatars (incarnations) of the Supreme Lord, now regarded as Vishnu, the Creator among the Hindu trinity of Brhama, Vishnu and Mahesh.

On the battlefield of Kurukshetra, where the Great War of Mahabharata was about to commence, Arjuna, the great archer Prince of the Pandav dynasty facing the armies of the related clan of Kauravas, was overwhelmed by the piquancy of having to do battle unto death with his own kin. He voiced his feelings of utter confusion and dejection by seeking to lay down arms rather than destroy his own flesh and blood for the sake of worldly wealth in the form of the Kingdom of Hastinapur for his Pandava clan. Krishna, the renowned warrior strategist with manifest divine origins and nature, had sworn not to take to arms or sides with either of the two feuding clans since both were his friends and relatives. He had therefore offered to both either his powerful army, or only himself, unarmed. The Kauravas had chosen his army, and the Pandavas chose him alone. Krishna offered to be the charioteer of Arjuna, his friend and the prime archer among the Pandava brothers. Thus, seeing Arjuna falter on the eve of the great battle, Krishna gave him the message of Gita, which has since become not only Hinduism's but one of Humanity's universal theological philosophy.

Krishna's message, or the teaching of the Gita, in the briefest nutshell, was based on the philosophy of Karma, or Action. According to the Gita, Man was enjoined to do his dutiful and right (moral) Karma, without seeking fruit in the form of rewards, but ascribing, or offering the latter, as indeed the Karma itself, to the Lord. Krishna also expounded the doctrine of Re-birth in which the soul passes through several incarnations. Thus, earthly relations such as father, mother, brother, uncle, wife, son etc are all essentially illusory and impermanent. Only the corporeal body dies. The soul does not. The soul is untouched by pain, joy or death. It remains unscathed, and passes through cycles of birth and rebirth till its good Karmas release it from these sagas of suffering and unite it with the Supreme. Thus, opined Krishna, the father of this birth may be the son in the next. Such relations are transient, as is Life. Only the soul is permanent, and its journey through time is governed by Karmas performed through the various Lives. Only Karma which is performed in the line of duty, is moral, and whose rewards are not sought but even if accruing are offered to the Lord is the one which is the noblest. After hearing the exposition of this new and great philosophy of the Gita, Arjuna took up arms and the battle of Mahabharata was fought and won victory for the morally rightful Pandavas. The Gita has also been called the Song Divine. It is written in Sanskrit in the form of shlokas, or poetic stanzas, and comprised of 18 chapters. It has been translated in all major languages of the world and has been the subject of innumerable commentaries. Many of its principal cornerstones, eg the idea of Karma, rebirth, the immutability of the soul etc have entered not only the parlance, but the spirit of the modern universal human psyche. (RNS)



**BHOPAL :** Bhopal is a city in the State of Madhya Pradesh in central India. It is the site of an industrial tragedy, which killed about 2000 people and injured many others. In 1985, Union Carbide chemical industry met with an accident, which involved the leak of the poisonous gas methyl isocyanate (MIC). The victims who inhaled MIC were subjected to cyanide poisoning with necrosis of the cells in the respiratory tract. Many legal and ethical issues were raised, some of which were not settled. (JA)

**BIAS:** 1. Prejudice or discrimination. (See DISCRIMINATION, RACISM, AFFIRMATIVE ACTION) 2. Error which is directional, as opposed to noise, or random error. Accuracy is freedom from bias. (See ERROR, NOISE) (MP)

**BIBLE:** Christian scriptures containing the Jewish scriptures (see OLD TESTAMENT) and the NEW TESTAMENT (q.v.). There are some (fairly minor) differences between the various Christian Churches as to which documents are included within the canon of scripture. (See RELIGIOUS EDUCATION) (MR)

**BICYCLE TRANSPORT:** Safe and extensive bicycle transport networks are an essential component of a healthy city. Cycling is an addition rather than an alternative to car commuting. Advantages in cities include less traffic congestion, parking space and air pollution, and advantages to cyclists are equitability, convenience, exercise and enjoyment. In some cities there is a monthly "Critical Mass"; a cyclist demonstration and congregation on central city arteries to highlight the demand for cycle-ways and affirm cyclist road rights. Many Asian and other poorer countries have high proportions of cyclists on the roads, but models for bicycle-friendly cities may be found in certain European countries such as Holland, where safe cycle-ways and a culture of respect for cyclists are standard. (See SUSTAINABLE CITIES) (MP)

**BIG BANG:** Astrophysical theory about the origin of our universe. The Big Bang was the beginning of both time and space, a giant explosion around 14 billion years ago which expanded rapidly, cooled and coalesced into the universe of today. Some predictions from the theory have since had corresponding data from the distant universe, and the theory is believed by much of the science community. The total mass of the universe will have a bearing on whether the universe will continue expanding forever (the 'heat death' of the universe) or contract back again due to gravity (the 'Big Crunch'). (See BLACK HOLE, OMEGA POINT THEORY, PARALLEL UNIVERSES THEORY, COBE) (MP)

**BIG BROTHER:** See INTERNET PRIVACY.

**BIG PICTURE:** See INTEGRATED MANAGEMENT, HOLISTIC THINKING, GENERALIZATIONS.

**BIGOTRY:** Conduct or mental state of one who holds disreputable view(s). Nowadays, for example, a racist would be said to be bigoted. (MR)

**BILIRUBIN :** Natural breakdown product of hemoglobin occurring in reticuloendothelial system High level (2 to 2.5 mg per ml) results in jaundice.

**BING FA:** See SUN TZU.

**BIOACCUMULATION :** See BIOMAGNIFICATION.

**BIOCENTRIC:** Central prime mover is a consideration of equality to all forms of life. It considers the view from the individual organism,

and may ascribe equal rights to all forms of life, E.g. Vedic Indians considered plants as divine (see ANTHROPOCENTRIC). (JA+IP)

**BIOCHEMICAL OXYGEN DEMAND (BOD)** : An indicator of the consumption of dissolved oxygen (DO) by biological processes and organisms in a water body or sample. BOD is the equivalent oxygen gas concentration chemically required to biologically oxidize the reducing agents in the water sample; if DO is low, then BOD is likely to be high. (See DISSOLVED OXYGEN) (MP)

**BIOCHEMICAL WASTE TREATMENT FACILITY** A facility wherein treatment of disposal of biomedical waste or processes incidental to such treatment/disposal is carried out. (JA)

**BIOCHEMISTRY**: The science of the chemistry of living organisms and their life processes (see BIOTECH AND BIOTECHNOLOGY). (IP)

**BIOCOENOSIS**: Bios (life), coenosis (seamless union), living together without a dividing wall in between organisms, used frequently in Russian literature, means a community. (JA)

**BIOCONVERSION** : BIOS = life, It is a method in biotechnology. Transformation of chemical products into its raw materials or into another form by biological organisms like converting hydrocarbons to alcohols also called biological transformation or microbial transformation (since microbes are used). Extensively used in organic chemistry for carrying out complex synthesis. e.g. fermentation of sugar into alcohol by microbes. The soil bacterium *Pseudomonas* can break down organic compounds and has been used in industrial applications. Organic waste can be converted to the biogas methane when fermented under anaerobic conditions. Methane can be used to produce light and in cooking. (JA)

**BIODIVERSITY**: see Biological diversity - indicates the total number of living species found in the biosphere including variations found in form and function in the entire biological systems. Three types of biodiversity- genetic (molecular), biological (organismal) and habitat (ecological), the word first appeared in biological literature in 1986, given preeminent importance during the Convention on Biodiversity held in Rio in 1992. Biodiversity is an index of the biological wealth of this planet (see CONVENTION OF BIOLOGICAL DIVERSITY) (JA+GK+IP)

**BIODIVERSITY HOTSPOT** : A region of very high endemism where threats to habitat integrity or of extinction are also high. As human activities are drastically accelerating extinction worldwide and only limited resources are available to conserve many endangered organisms, this concept was proposed to focus effort and funding on areas where there might be the best possible conservation results. Conservation International (<http://www.conservation.org/xp/CIWEB/home>) leads efforts to mobilize international public and private resources to support conservation of biodiversity hotspots with involvement of local communities. (RW)

**BIOENGINEERING**: The study of the relationship between living organisms and machinery; for example, the industrial application of the results of biologic research in the field of recombinant DNA technology which permits the production of synthetic hormones, enzymes, therapeutics etc. (See BIOPHYSICS; BIOTECH; BIOTECHNOLOGY; GENETIC ENGINEERING). (IP)

**BIOETHICAL MATURITY:** Term coined by Darryl Macer in 1994. A mature society is one which has developed some of the social and behavioural tools to balance bioethical principles, and apply them to new situations raised by technology. We could call the bioethical maturity of a society the ability to balance the benefits and risks of applications of biological or medical technology. It is also reflected in the extent to which the public views are incorporated into policy-making while respecting the duties of society to ensure individual's informed choice. Awareness of concerns and risks should be maintained, and debated, for it may lessen the possibility of misuse of these technologies. Other important ideals of bioethics such as autonomy and justice need to be protected and included in the benefit/risk balancing which is important for the ethical application of biotechnology in medicine. Concern about technology should be valued as discretion that is basic to increasing the bioethical maturity of a society, rather than being feared as a barrier to the implementation of new technology. (DM)

**BIOETHICS** 1. the study of life ethics. A word coined in the later part of the 20<sup>th</sup> century to describe the various rights and wrongs of new scientific and technological procedures and discoveries (in particular in response to human experimentation during World War II) which were seen to bear a direct and significant impact upon humane survival". 2. Rules of conduct in scientific research and involves many disciplines and skills such as law, philosophy, theology medicine, science and technological research [derived from Greek *bio* - life and *ethicos* moral]. 3. Love of Life. (see BIOSCIENCE ETHICS). (IP+DM)

**BIOETHICS COMMITTEES:** Groups of people set up to adjudicate about bioethical matters. In an increasing number of countries such committees are established in law and are charged with certain legal responsibilities, typically about the conduct of research or clinical practice at either local or national level. (MR)

**BIOETHICS INFORMATION DIRECTORIES:** Bioethics is a subject which covers an encompassing range of issues and information. Organizations and internet directories which increase the accessibility and dissemination of bioethics information include Eubios Ethics Institute, Kennedy Institute of Ethics, Bioethicsline, Bioethics Net, International Association of Bioethics, International Society for Environmental Ethics, and Institute for Global Ethics. (See MEDICAL INFORMATION DIRECTORIES, ENVIRONMENTAL INFORMATION DIRECTORIES) (MP)

**BIOGAS** : is a non conventional energy, methane as a natural gas is an example. When organic waste is fermented using methanogenic bacteria, methane is produced also called the marsh gas. Biogas is an alternate source of energy, can be used in domestic applications such as lighting a house. (JA)

**BIOGEOCHEMICAL CYCLE:** Refers to the reciprocal interactions between living organisms and their elemental bio-cycles. Earth is essentially a closed system with respect to carbon, hydrogen, oxygen, nitrogen, phosphorus and sulfur the elements organisms need in large quantities; thus, these elements cycle from the environment through organisms back to the environment in sustainable harmony. There are two major types of biogeochemical cycles - gaseous and sedimentary, where each element has its distinct cycle with the specifics depending on its physical and chemical properties and how it is utilized by organisms (see CARBON CYCLE; NITROGEN CYCLE; HYDROLOGICAL CYCLE). (JA+IP)

**BIOGEOCHEMISTRY** : The study of fluxes and transformations of the materials that constitute the Earth, including the Earth's interior, surface, oceans, and atmosphere. (RW)

**BIOGEOCOENOSIS:** A seamless partnership between living organisms and their physical environment. Frequently used in Russian literature, equivalent to the word "ecosystem". (JA)

**BIOGEOGRAPHY:** The branch of biology which studies the geographical range and distribution of animals and plants across the earth. Of particular importance to ecological sustainability is the distribution and abundance of keystone, endangered and exotic pest species. (MP)

**BIOHAZARD:** A health hazard from a biological organism or substance. (See BIOSAFETY). (DM)

**BIOINFORMATICS:** The acquisition, management, analysis, storing and processing of biological information; such as, gene sequences, genomics, biological structures, pharmaceutical chemicals, taxonomy, biodiversity and environment. Biomolecules such as DNA and proteins have large amounts of information of biological interest. DNA is called the blue print of life and proteins are the building blocks of life. Developed out of a combination of computer science, information technology and genetics to determine and analyze genetic/biological information, and these technologies can be now used as a scientific basis on which ethical decisions can be made. Origin - the first bioinformatic databases were constructed a few years after the first protein sequences began to become available. The first protein sequence reported was that of bovine insulin in 1956, consisting of 51 residues. Nearly a decade later, the first nuclei acid sequence was reported, that of yeast alanine tRNA with 77 bases. Soon thereafter Dayhoff gathered all the available sequence data to create the first bioinformatic database . Organizations in biomolecular databases have two goals: (i) to get valuable and practical information out of these databases (ii) to integrate information from diverse sources. DNA databases are stored in GenBank Company in USA and also in the European Molecular Biology Laboratory in Germany. Similar protein sequence databases are also available. (See INFORMATICS, GENBANK) (IP, JA)

**BIOLISTICS :** A useful method to transport DNA into any organ, cell using a Particle gun/biolistic gun. Can also transfer DNA into animal tissues, plant cells and fungal as well as into mitochondria . (JA)

**BIOLISTIC GUN :** See PARTICLE GUN.

**BIOLOGICALS** Any preparation made from organism or microorganism or their product metabolism/biochemical reactions intended for use in the diagnosis/immunization or in the treatment of human beings or animals in research activities. (JA)

**BIOLOGICAL:** Any event/processes relating to life/organisms. (JA)

**BIOLOGICAL CONTAINMENT**

**BIOLOGICAL CONTROL** is a method of controlling pest species by introducing one of their natural predators or otherwise interfering with their life cycle; for example, the Mediterranean fruit fly has been successfully controlled by the method known as "sterile male technique" where unproductive adult flies are released into their habitat after the pupae were sterilized by exposure to gamma radiation. This method has distinct advantages over the use of toxic, non-biodegradable chemicals. (IP)

**BIOLOGICAL DETERMINISM** theory that human action or behavior (aggression, sexual orientation, sex roles, intelligence and so on) are not free but set by genetics. The theory always becomes popular at times of political austerity where whole populations are encouraged to believe that their social prejudices are scientifically based (see DETERMINISM). (IP)

**BIOLOGICAL DIVERSITY** See BIODIVERSITY.

**BIOLOGICAL SCALES:** Fields of biology and units of biodiversity organized by increasing scale and complexity are as follows: carbon

chemistry leads into biochemistry, genetics, molecular biology, cellular biology, physiology, organism biology, behavioral studies, community biology, ecology, environmental biology, human ecology, evolutionary biology, Gaia hypothesis, artificial life, psychology, consciousness and further into biological philosophy and bioethics. (See BIOLOGY, BIODIVERSITY, BIOETHICS). (MP)

**BIOLOGICAL SYSTEMS:** see BIOSYSTEMS.

**BIOLOGICAL TISSUES BANKS: BLOOD BANK, DNA BANK, CELL BANK, ORGAN DONOR BANK.** Refers to a collection of samples gathered from free donors, whose purpose is to serve as tissue (blood) or organ donor center to save sick peoples' lives (blood transfusions or organ transplantation). DNA and cell banks are meant to provide samples for research purposes, either in genetic, physiology, biochemistry or other experimental protocols. Neither of these tissue banks have commercial interests. In the case some money is charged, it is to compensate the costs of maintaining, culturing and dispatching the samples. (See also REPOSITORY.) (GK)

**BIOLOGICAL WARFARE:** Waging war by the deployment of biological weapons; that is, the deliberate release of natural or genetically engineered disease causing organisms, or their products, into enemy territory. The threat of biological warfare has not decreased since the signing of the 1972 worldwide treaty on Biological and Toxic Weapons which in theory prohibits their development and deployment. On the contrary, the danger of institutionalized terrorism has become more real with the alleged stockpiling of many agent of germ warfare (see BIOWEAPON, INSTITUTION OF WAR & VIRTUAL WARFARE, ETHNIC CLEANSING). (IP+GK)

**BIOLOGY:** Bios (life), logy (study). The science of life. Includes the study of zoology and botany. The term appeared in a book title during 1802 by a German physician, Gottfried Reinhold Treviranus, the title of the book being, "Biologie oder Philosophie der lebenden Natur für Naturforscher und Aerzte (Biology, or philosophy of the living Nature for Scientists and Physicians)" Source - j.frings@hccnet.nl (JA)

**BIOLUMINESCENCE AND BIOELECTRICITY** the production of light or electric discharges by living organisms. The mechanism has evolved independently in many kinds of organisms from bacteria to vertebrates; for example fireflies who produce flashes of light used to attract mates, the electric eel who can generate up to 550 volts which it uses for offense and defense, fishes who use electric organs and electroreceptors for navigation purposes and a variety of deep-sea creatures who are luminescent by means of either light-producing body cells or by specialized organs containing luminous bacteria. Now we can also include human engineered chimeras, like the tobacco plant which produces a dazzling light when watered with an appropriate substrate due to the inclusion into its genome the luminescent firefly gene. (IP)

**BIOMAGNIFICATION :** The increase in toxicity of chemically stable synthetic human-made compounds which resist the natural detoxifying processes of excretion and decay, so the poison accumulates exponentially in the animal body as it progress up the food chain (see Food Web) and, through the process of magnification, the concentrations of any single pollutant can be millions of times greater in the body of a top predator (carnivores like the eagle, tiger or human) compared with the surrounding environment. For example, the biomagnification of PCBs in fish can be concentrated to reach an accumulation factor exceeding 250,000 times that in the water (see FOOD WEB, POLYCHLORINATED BIPHENYLS, ENDOCRINE DISRUPTERS & DDT). (IP)

**BIOMASS:** The total biological mass, quantity of living matter, or dry weight of a particular species, within a habitat or geographical area. Since species differ in size, the use of the mass rather than the number of organisms per unit of area helps to indicate the importance of a population in relation to productivity and the flow of energy and nutrients through an ecosystem. The global biomass consists of all of the organisms in the world. (See BIODIVERSITY). (MP)

**BIOMASS ENERGY:** Biomass energy is fuel stored in organic matter such as plants or animals and their waste products. Much of the

population in developing nations rely on biomass for fuel, especially from wood. Although a renewable resource, improperly managed use of fuelwood is having adverse impacts on habitats and biodiversity. The burning of dung indoors for heating or cooking has also been implicated in respiratory health problems. (See BIOMASS, RENEWABLE ENERGY) (MP)

**BIOME:** (Greek: *bio* "life" + *oma* "tumor" or "mass"). A major ecological community or category of habitat, and having a characteristic ecology, climate or geographical region. (MP)

**BIOMEDICAL ETHICS:** Domain of ethics (moral philosophy) concerned with such medical matters as ABORTION (q.v.), CLINICAL TRIALS (q.v.) and EUTHANASIA (q.v.). (MR)

**BIOMEDICAL RESEARCH:** Biomedical research is usually thought of as highly scientific laboratory or clinical research. But vast numbers of the world's population, maybe the majority, have no access to medicine at all. They have little chance to benefit from the results of high-tech medical research. So research into methods to teach healthy behavior to medically deprived populations should be thought of as a central part of biomedical research. This research would include strategies for encouraging avoidance of sexually transmitted diseases (as through condom use), healthy and sanitary childbirth, simple methods of environmental health, like digging a pit for nightsoil so that children won't wander in it barefoot and become invested with parasites, simple nutritional advice, etc. Researchers should seriously study whether low-tech biomedical research of this sort might save many more lives than the high-tech sort. (FL)

**BIOMEDICAL WASTE :** Atretions/secretions, contaminated with blood. (JA)

**BIOMETRICS:** 1. Also known as biometry, biometrics is the application of statistics to biological data. 2. The use of distinctive biological characteristics for the recognition and positive identification of an individual. The most familiar biometric tag is the fingerprint, but the technology is fast advancing examples include iris pattern scanning, electronic voice verification, DNA fingerprinting and face recognition in security cameras. (See BIG BROTHER) (MP)

**BIOMIMETICS:** Engineering which mimics designs from nature to produce new functional or technological innovations. (MP)

**BIONICS:** The science of combining electronic principles, prosthetic technology and computer science to rehabilitate and restore function; such as artificial pacemakers used to correct abnormal heart rhythms, cochlear implants to reduce deafness by direct stimulation of the auditory nerve, and implantable retinal microchips to improve vision. (See CYBORG, CYBERNETICS, LIFE EXTENSION, DISABILITY) (MP & IP)

**BIOPHILIA:** (Greek: *bios* 'life' + *philos* 'beloved') Word coined by E.O Wilson to describe the emotional affiliation of human beings for other living things, the innate tendency to focus on life and life-like processes . (DM)

**BIOPHYSICS:** The science of the application of the laws of physics to life processes. (See PHYSICS; BIOENGINEERING; BIOTECH; BIOTECHNOLOGY). (IP)

**BIOPIRACY** 1. The use of nature or traditional knowledge and/or medicines for modern use without consent and/or acknowledgment of their origins 2. theft of biological knowledge for profit. Origin - the first patent was granted to General Electric Company in 1971 for what the "inventor" - Anand Mohan Chakravarty - described as " *I simply shuffled genes, changing bacteria that already existed .*" This stimulated a rush by US corporations to understand, and ultimately, to patent and claim ownership of existent and modified life forms. From this behavior

the term "biopiracy" was coined (see web site at <http://www.cqs.com/biopiracy.htm>). (IP)

**BIOPROSPECTING** : Investigative collection of living organisms with the aim of uncovering potentially useful applications, for example biomimetic design features, unique genetic information, food and crop varieties, indigenous medicines, and especially with reference to the potential presence of pharmaceutically-active alkaloids. Conservationists and developers today find agreement over the value of biodiversity protection, at least on practical if not ideological grounds. Less than 1 or 2% of Earth's organisms have been examined - the investigation and conservation of global biodiversity remaining one of the last great unexplored and undervalued realms of scientific discovery. (See BIOINFORMATICS, BIOMIMETICS, BIORESOURCES, BIOPIRACY, BIODIVERSITY) (MP)

**BIOPSY**: The surgical removal of a cell or sample of tissue for diagnostic purposes. (DM)

**BIOREGION**: An integrated and continuous natural area which contains an interconnected biophysical system, for example a river catchment, mountain range or other discrete ecosystem. (See BIOREGIONALISM) (MP)

**BIOREGIONALISM**: The defining and management of regions according to their biophysical and ecological characteristics, without restriction by political borders or other arbitrary human boundaries. This recognizes the integrity and continuity of large biological systems such as habitats and ecosystems, and is the appropriate large-scale unit for integrated management and monitoring of environmental impacts and change. (See BIOREGION, INTEGRATED MANAGEMENT) (MP)

**BIOREMEDIATION**: Cleaning the environment of pollution and waste materials of human origin using the ability of microorganisms to break down complex organic and inorganic compounds. The organic decontamination or resuscitation of ex-industrial sites and other desecrated lands can be achieved using biologically active plants, fungi and bacteria. These destroy or degrade pollutant chemicals into their basic components and remediate the soil creating a viable ecology or usable land quality. For example, keratinophilic fungi can break down the keratins of hair, nails and feathers efficiently into basic biochemicals which can be reused. Bioremediation technologies include composting, land-farming organisms on site, bioreactor organisms cultured offsite, soil-bank air and water networks, ecological and biochemical techniques. Research includes enzymic incorporation of pesticide residues, and desalination of soils by plant biomass. Alternative chemical and physical remediation processes may also serve to transfer rather than to degrade many pollutants. (See BIOREACTOR, DECOMPOSITION, BIODEGRADABLE, RESTORATION ECOLOGY) (MP & JA)

**BIORESOURCES** Genetic resources, organisms or part thereof, populations or any other biotic component of the ecosystem with actual or potential use or value for humanity (Latin *resurgere* rise again). (IP)

**BIOSAFETY**: Concept dealing with the insertion of foreign genes in a species to yield a transgenic species and releasing it into the wild, may endanger the health food chain and diversity of ecosystems, ecobalance and human consumption. Implementation of international safeguards, Controlling agency like Food and Drug Administrative Office (US). (JA)

**BIOSCIENCE ETHICS**: Acts as the interface between science and bioethics - science is descriptive and ethically neutral as it deals with facts requiring verification, whereas ethics is prescriptive dealing with what ought to be and depends on intellectual justification; however, if the bioethical discussion is to be relevant to our knowledge-based lives, there is the expectation of high biological standards in agreement with modern scientific insights. Bioscience ethics resides in between scientific endeavor and its application into acceptable forms of bioethical



consensus with its major elements being increased understanding of biological systems, responsible use of technology and curtailment of ethnocentric debates more in tune with new scientific insights. Irina Pollard and Steven Gilbert first used the term in 1997 (see Bioethics , SCIENTIFIC METHOD). (IP)

**BIOSPHERE:** It is a combination of two words - bios (life) and sphere (globe), meaning a globe that can sustain life, e.g. Earth. Largest self-sustaining and self-maintaining biological system. Biosphere = Ecosphere. refers to the regions of the Earth's atmosphere and crust occupied by living matter (see Cryosphere, Hydrosphere & Exosphere) [Greek *bios* = life + *sphaira* = globe] (JA+IP)

**BIOSPHERE 2 PROJECT:** Biosphere 1 is Gaia, or the Earth. The Biosphere 2 Project was a closed-environment experiment in which 8 humans were enclosed for two years (1991-93) in a large artificial habitat in Arizona. The glass domes of Biosphere 2 contained 204,000 cubic meters including a mini-sea, mangroves, rainforest, desert and farm. Unexpected difficulties arose in the maintenance of the system over the two years, for example most vertebrate and insect species went extinct, including all plant pollinators. Most problematic was the biogeochemical regulation of water quality and the atmosphere, with oxygen in the end having to be added from the outside. Such mixed success maintaining a self-sufficient colony can only further impress the need for preservation of the intricate ecological life-support systems already provided by the Earth, but taken for granted. (See BIOSPHERE, ARTIFICIAL HABITAT) (MP)

**BIOSYSTEMS:** resultant of interaction between abiotic factors and biotic factors eg. Gene system, cell system, organ system, organismal systems, population systems and ecosystems (JA)

**BIOTA :** The combined living organisms of a given ecological habitat, biome or geographical region, comprising all of the plants, animals and microorganisms. The collection of all organisms living in a place. (See BIODIVERSITY, BIOMASS) (MP, RW)

**BIOTECH:** The shortened form of "biotechnology" which first appeared in the 1970s when it became possible to manipulate the genetic make-up of living organisms; for example, biotech companies can create plants and animals with new characteristics such as resistance to disease where the biotechnician is a person working in a biotech laboratory. Since the 1970s, the creation of modified life-forms have generated heated ethical and environmental controversy (see BIOTECHNOLOGY AND GENETIC ENGINEERING). (IP)

**BIOTECHNOLOGY:** The use or development of techniques using organisms (or parts of organisms) to provide or improve goods or services. It is the application of biological knowledge for the purpose of solving practical problems in healthcare, agriculture, veterinary science and related fields (see BIOTECH AND GENETIC ENGINEERING). (IP, DM, DR)

**BIOTIC COMMUNITY :** The community consisting of all of earth's living organisms. The proposal for an extension of ethics to cover all the species of the living systems emerged in the 20<sup>th</sup> century, particularly by means of Aldo Leopold's "A Sand County Almanac and Sketches Here and There" (1949). (CP)

**BIOWEAPON :** A weaponry must have the killing power and is easy to manufacture and handle; to weaponise biological organisms as agents of mass destruction of human beings. Between a 100 Kg bomb and 100 Kg bacteria, the kill is greater in the later. It can kill from one to four million people depending upon the spread of bacterial. See Anthrax, smallpox. (JA)

**BIPOLAR (MANIC) DEPRESSION:** a spectrum disorder where the sufferer can be in varying degrees manic (elation/excitement) or even-tempered, depressed (melancholia) or normal, or alternating between mania and depression. The condition can be severe, intermittent or chronic and can be primary or secondary. A primary depression is one where the particular mood disorder is the dominant problem, while in a secondary depression a number of psychological, physiological and/or social variables, for example, schizophrenia, drug abuse (alcoholism, marijuana, amphetamines, cocaine), extreme nutritional deficiencies and physical illness, may produce the symptoms. On the whole, bipolar patients are a much more homogeneous group compared to unipolar depressives as they experience, in varying degrees, alternating cycles of mania and depression. They are also more responsive to treatment with lithium salts than are those with recurrent attacks of depression only. If severe manic episodes escalate, the patient may lose contact with reality, hallucinate and, if coupled with paranoia, become openly psychotic (see DEPRESSION; UNIPOLAR DEPRESSION; BRAIN NEUROTRANSMITTERS; LITHIUM; SEROTONIN RE-UPTAKE INHIBITORS). (IP)

**BIRDS :** Homeothermic (warm-blooded), feathered, egg-laying vertebrates of the class Aves. The forelimb of birds is in the form of a wing, though not all birds fly. According to the World Conservation Union (IUCN) Red Book data from year 2000, about 12% of birds face a serious risk of extinction during the next 100 years. (RW)

**BIRTH CONTROL:** The prevention of birth. Birth control has been practiced by different contraceptive methods in almost all cultures and epochs. It has not been an exclusivity of females, since males have used different means to kill sperm cells before intercourse. Birth control policies in Latin America have been introduced with great effort since the sixties, first by private ONGs, then by national health services, but in many of these countries, the Catholic church has tirelessly been opposed to any method different from the rhythm method (Ogyno). As a result of educational campaigns and higher schooling, middle to upper classes in these countries have gained control over their reproductive choices, reducing the overall birthrate, but lower classes still have high numbers of children and do not use contraceptive methods. (GK)

**BIRTH DEFECTS :** hereditary birth defects are transmitted by the parent's genes; however, many birth defects are the result of the greater uncertainty about their predictability. (See TERATOLOGY; CONGENITAL MALFORMATION). (IP)

**BIRTH RATE:** Quantification of the potential rate of increase of a population due to the production (birth) of new individuals. Normally expressed as number of young produced per adult female per unit time. (MR)

**BIT:** (Binary + Digit) A bit is the smallest unit of information in mathematics or computer terminology, representing the presence or absence of a single feature (1 or 0; on or off). Eight bits comprise one byte. (See BYTE, QUBIT) (MP)

**BLACK AND WHITE THINKING:** See CONTINUUM, ADAPTIVE THINKING.

**BLACK HOLE:** Coined in 1969 by John Wheeler and further theorized by Stephen Hawking among others, a black hole is a point in the universe of immense gravity, often created by the collapse upon itself of a giant star some twenty times the size of our Sun or larger. A black hole is so dense that matter or light cannot escape once past the 'event horizon'. The centre is postulated to be an infinitely dense point known as a 'singularity'. Contrary alaxies. (See WORMHOLE, SINGULARITY, EVENT HORIZON, BIG BANG, PARALLEL UNIVERSES THEORY) (MP)

**BLASTOCYST:** A hollow ball of cells, filled with fluid, that forms about four days after fertilization from the zygote, and prior to the beginning of the process of implantation. The embryo develops from a small cluster of cells in the centre of the sphere, and the outer wall of the sphere becomes the placenta. (DM)

**BLASTOMERES:** The daughter cells that derive from the first and subsequent cleavages of the zygote. (DM)

**BLIND EXPERIMENT:** See DOUBLE BLIND EXPERIMENT

**BLOOD BANKS:** See TISSUE BANKS.

**BOARD :** An authority with office bearers and expert members possessing qualifications, knowledge and experience of scientific engineering or management aspects of a given subject for example, Pollution. The Board accordingly is the Pollution Control Board, which is empowered to give directions requiring control measures. (JA)

**BOAT PEOPLE:** A term often used to mean illegal immigrants arriving by boat, often in an attempt to escape brutality or impoverishment. In sympathy, perhaps it should be remembered that Europeans in Australasia and North America, and Chinese and Korean forefathers of Japanese in Japan, were originally boat people themselves. (MP, DM)

**BODHISATTVA :** Buddha-in-the-making, literally an "enlightenment being"- to keep free all beings from the coils of suffering. (JA)

**BOMBS:** See EXPLOSIVES.

**BONE MARROW :** soft, spongy tissue found in the center of large bones that is essential in the manufacture and maturation of blood cells (white cells, red cells and platelets). It is sensitive to the effects of radiation, anticancer drugs and toxic agents (e.g. benzene). Damage to the bone marrow can cause leukemia or suppressed immune system. (See CANCER; IMMUNE SYSTEM; IMMUNITY). (SG2)

**BOOK OF ENOCH:** The name of several unrelated books of the Apocrypha. Each of these books is ascribed to the Biblical figure Enoch, who has long been associated with visions, due to the cryptic note in Genesis 5,24 that he was no longer to be found because God "took him". No direct mention is made of Enoch's death, and so, a tradition developed that he ascended alive to Heaven. Each of the books called "Enoch" describes a collection of heavenly visions. The Ethiopian Book of Enoch in particular supplies much information on angelology, and supplies the names of a large number of angels. (AG)

**BOOK OF MORMON:** A central scripture of the Mormons. This book is actually a collection of many books, and serves as a "Third Testament" for the Mormons, in addition to the Old Testament and the New Testament. The Book of Mormon chronicles historical events and figures important to Mormon history starting from the 2nd Temple period in Judea, and continuing in North America of ancient times. According to Mormon tradition, this history was written on golden plates in a form of the Egyptian language and was hidden in ancient times in North America. In modern times, they were rediscovered by Joseph Smith, and with the assistance of the angel Moroni, Joseph Smith translated these records on the golden plates from Egyptian to English. The standard Book of Mormon is now printed in English. Two other books important to Mormons (although not as central as the Book of Mormon) are "Pearl of Great Price", and "Doctrines and Covenants".

(AG)

**BOOK OF THE DEAD: Tibetan Book of the Dead** (In Tibetan, "Bardo thos grol chen mo", meaning "The Great Book of Natural Liberation Through Understanding in the Between". The popular title of the book in English, however, is "Book of the Dead"). A Tibetan Buddhist text written by Padma Sambhava in the 8th/9th century which explains the stages through which a person goes during the process of dying, and the process through which the person's soul is reborn into another body to begin a new life. The book is useful both to an individual who is dying, and to relatives and friends, because it explains both what process the dying person goes through and the prayers which are helpful in assisting the individual to be reborn in the next life. The book contains a day by day description of the stages the individual's soul goes through, and the beings it encounters leading up to rebirth. (AG)

**BOOK OF THE DEAD: Egyptian Book of the Dead** A collection of magical texts which were written on papyrus by the ancient Egyptians and placed upon their dead in order to assist the deceased with their journey through the netherworld, and to help them deal with the dangers of this journey, and ultimately help them attain the afterlife. The text was divided into spells, and was accompanied by pictures and illustrations which further explained the various aspects of the netherworld. The earliest such collection of papyri from the middle of the 15th century bce, but the traditions contained within them are a great deal more ancient. (AG)

**BOOLEAN LOGIC:** Named for the English mathematician George Boole, 'Boolean Logic' uses the logical relationships AND, OR and NOT, useful for symbolic representation in 'Boolean algebra' and computer programming. (See GAME THEORY, MODEL) (MP)

**BOOMERANG:** Australian Aboriginal returning and non-returning flat hardwood object used for hunting or ceremonial purposes. Nowadays the most popular model is shaped such that the projectile returns to its thrower. In areas of Arnhem Land in the Northern Territory it was also used as a musical instrument as well as a hunting tool. Term is also colloquially used to indicate 'the return to' or 'recoil upon' the originator of an idea, gift, promise etc like "*a boomerang decision*", "*a boomerang cheque*" and of particular importance a dishonored political promises made to the Aboriginal people like "*boomeranged promises*" (see CORROBOREE; RECONCILIATION). (IP)

**BOREAL FOREST:** See CONIFEROUS FOREST.

**BOTANICAL GARDENS:** is an example of ex situ conservation where endangered plants are grown under human care and protection. There are about 1,500 botanical gardens world wide, mostly found in industrialized countries. About 230 botanical gardens are found in topical developing countries, which are rich in plant diversity. (JA)

**BOTANY:** (Greek: *botani* "plant") The branch of biological science dealing with plant life, for example the classification, structure or ecology of plants, or the flora characteristics of a particular time or region. (MP)

**BOTULISM:** (Latin: *botulus* "sausage"). An often fatal form of food poisoning caused by the endotoxin produced by the anaerobic bacterium *Clostridium botulinum*. The toxin is ingested in contaminated food from improper sterilization during canning or preservation, but the live bacteria need not necessarily be present once the toxin has been released. Unlike other forms of food poisoning, symptoms occur from 18 hours up to one week post-ingestion, and include lassitude, fatigue, muscle weakness and visual disturbances. Nausea and vomiting occurs in

less than 50% of cases. Two thirds of cases are fatal, usually as a result of delayed diagnosis and treatment. (See ENDOTOXIN, FOOD SAFETY) (MP & IP)

**BOTULINUM TOXIN** : A bacterial toxin of *Clostridium botulinum* , One gram of crystalline toxin can kill about one million people. (JA)

**BOVINE SPONGIFORM ENCEPHALOPATHY (BSE)** a fatal degenerative Prion brain disease of cattle characterized by clumsy, jerky movements, loss of balance and apprehensive behavior. The disease was first observed in cattle by veterinarians in 1983 with its outbreak in England being associated with other spongiform encephalopathies such as scrapie in sheep, from which it is hypothesized it crossed species through scrapie-infected bone and meal supplemented cattle feed. The subsequent outbreak of a new variant of Creutzfeldt-Jakob disease in humans during the 1980s was blamed on the consumption of BSE-infected beef, though there is no conclusive scientific proof of this transmission; however there is a major concern as bovine albumin has been routinely used in Assisted Reproductive Technology programs, organ culture media and blood products (see PRIONS & CREUTZFELDT-JAKOB DISEASE). (IP)

**BOVINE SOMATOTROPIN (bST)** : Somatotropin is a growth hormone found in all mammals, and in lactating cows (bovine) it increases milk production. In the early 1990s, bacterium E. Coli was genetically engineered to produce bST, which made its use economically practical in dairy farming. Bovine Somatotrophin hormone also know as Bovine Growth Hormone. However, the use of bST to increase commercial milk production continues to be controversial. The genetically engineered (GE) hormone (rBST) was manufactured by a multinational company, the Monsanto as an agricultural product to improve the growth rate and protein and was approved for use in USA in 1993. A few side effects in animal health concerns have been noticed in the treated cows which include increased risk of udder infection (mastitis) , lameness and a reduction in life span. (See GENETIC ENGINEERING). (SG2, JA)

**BRAIN** : The structure of the nervous system that provides the highest level of integration, control and regulation. It weighs about 1.5 kg in the adult (only about 2.5% of body weight) but receives 15% of the blood supply and 25% of the oxygen consumed by the body. The cells in the brain are far more individualized in structure and function than cells in any other part of the body. The brain can be divided up into a) cerebrum comprised of four lobes (frontal, temporal, parietal and occipital) where each lobe has special functions; b) cerebellum which helps the body to maintain balance by integrating several kinds of information such as vision, inner ear and impulses caused by the effect of gravity. Besides equilibrium the cerebellum affects muscular coordination and the autonomic execution of fine movements; c) the brain stem that connects the higher brain centers with the spinal cord and is the seat of the basic involuntary functions in the brain stem. The brain stem is divided up into several sections - the hypothalamus which regulates the hormones through the body by its secretions to the pituitary gland (growth, puberty, metabolism and reproduction) and the lowest part being the medulla whose cells control many autonomic and involuntary functions such as heart beat, breathing, intestinal activity and so on. (See BRAIN NEUROTRANSMITTERS). (IP)

**BRAIN DEATH** : Defined as the entire, permanent, irreversible cessation of functions of the brain stem that is synonymous with brain-stem death, since the centers for the control of such essential body functions as consciousness, respiration and blood pressure are situated within the brain stem". It is significant that guidelines on live donor transplantation, Cadaver donor transplantation and the on recipients of transplantation are being considered (JA..+FL,IP)

**BRAIN DEATH, BRAIN-STEM DEATH:** After the first heart transplant in 1968, people began to raise questions about whether a heart can

be transplanted without murdering the donor. For the procedure can be begun only if the heart has not died a natural death, ie only if it is still beating. But if the heart is beating then the patient seemed -- by traditional standards -- still to be alive. The problem was solved in many countries by defining "death" as the death of the brain. "Brain death" was then defined as brain-stem death, and clinical criteria were developed for determining brain-stem death.

Brain death is to be distinguished from other syndromes, like Persistent Vegetative State, Permanent Vegetative State, Locked-in Syndrome, Advanced Dementia, etc, where one may be unresponsive to stimuli while the brain is nonetheless alive. Indeed in the Persistent Vegetative State there are discernible periods of sleep and wakefulness, and there has been some success in restoring PVS patient to various degrees of conscious function, as has been reported in a number of papers by Keith Andrews in London.

In a classic paper, Robert Truog and James Fackler (Critical Care Medicine, (1992) 20: 1705-1712) brought considerable clinical evidence to show that patients who have satisfied then-current criteria for Brain Death retained, nonetheless, brain function in the forms of hypothalamic endocrine function; cerebral electric activity; some environmental responsiveness with clear hemodynamic response to surgical incision at the time of organ removal; and spinal cord function in the form of spinal reflexes.

In the light of these data, one might easily conclude that we are harvesting organs from people who are really alive. Such a conclusion can lead to either of two quite contradictory courses of action. On the one hand it can be concluded that if we are already taking organs from live people, then we may as well find even more fruitful sources of organs and take them from patients in the Persistent Vegetative State (a position close to that advocated in a later article by Truog: Is it time to abandon brain death? HCR (1997) 27:29-37), or even from severely demented or other seriously mentally ill patients. But on the other hand one might conclude exactly the opposite, ie that if heart and other major organ transplantation requires taking organs from live people, then this is murder and such transplantations ought to be stopped.

The dilemma is reflected in debates within ancient spiritual cultures, such as Israel and Japan. Since 1997, Japan has had a law allowing taking hearts from brain-dead patients, for transplantation. But there both lay and scientifically educated Japanese have been reluctant to donate, perhaps because of deep-rooted beliefs about the importance of heartbeat and blood to life. Important aspects of brain-death and transplantation in Japan are discussed by Dr Masahiro Morioka in his website: <<http://www.lifestudiesnetwork.com/specialreport01.html>>

As for Israel, the basic spiritual source, the Bible, is ambiguous. One verse says: "And the Lord, God formed the human of the dust of the earth, and breathed into his nostrils the breath of life, and the human became a living being". (Genesis: II,7) This has been used (together with a Mishna in Tractate Yoma) to argue that the ability to breathe is the basic criterion for human life. So since the controls for spontaneous breathing are in the brainstem, the death of the brainstem is death. But the Bible says in another place: "Only be sure not to eat the blood, for the blood is the life...." (Deuteronomy XII,23) So one can as easily argue that the circulation of blood is the basic criterion of life. So as long as the heart is beating and blood is circulating, one is alive.

Israeli law and the Chief Rabbinate (the major government-established religious authority) recognize brain death and both allow and encourage major organ donation. But a large number of other religious authorities in Israel refuse to accept heart transplantation. Their reasons are not simply a matter of religious faith, but based on scientific and clinical evidence of the kind cited in Truog's articles (cited above). But their conclusions from the evidence are of course the opposite of Truog's.

As for method's of determining brain death based on advanced imaging techniques, some rabbis argue that it is not necessary to use such procedures unless there is a doubt whether the patient is dead or alive. But if the patient should be alive (although dying) then subjecting the

patient to these procedures is unnecessarily disturbing, and perhaps hastening the death, of a dying patient. (FL)

**BRAIN NEUROTRANSMITTERS:** (Greek: *neuron* 'nerve' + Latin: *transmittere* 'to transmit') A substance produced in and released by one neuron, that diffuses across a synapse and excites or inhibits the postsynaptic neuron or neurones. There are four principal neurotransmitters in the brain; dopamine, noradrenaline (norepinephrine), serotonin and acetylcholine and together they balance physical health and the chemistry of mood. Dopamine and noradrenaline are both members of the catecholamine family because they are produced from tyrosine, an amino acid present in the normal diet. Serotonin, an indoleamine, is a close cousin and manufactured from another dietary amino acid called tryptophan. Dopamine, noradrenaline and serotonin are collectively known as monoamines and, together with another monoamine acetylcholine, which is more involved in muscle movement and thinking than in mood, they are the key brain messengers maintaining the flow of information across the synaptic junctions of the limbic system. The limbic system has three major functions; maintenance of homeostasis, development of nurturance skills and monitoring emotion. When, for whatever reason, the balance of these neurotransmitters is disturbed, emotional regulation becomes unstable and in those individuals genetically vulnerable to bipolar disorder, for example, the syndromes of melancholia and mania may develop. In cases of severe mania, acute schizophrenia or psychosis, it is dopamine which dominates the pathways of limbic communication. Antidepressants and many mood-altering drugs - including those that produce addiction; such as amphetamines or cocaine - similarly achieve their behavioral effect by blocking or mimicking neurotransmitter activity and altering the messenger balance at the synapse and the homeostatic mechanisms that regulate synaptic transmission (Greek *neuron* nerve + Latin *transmittere* to transmit) (see UNIPOLAR DEPRESSION; BIPOLAR DEPRESSION; NEUROHORMONE; DEPRESSION; ADDICTION). (IP)

**BRAIN-STEM DEATH :** See BRAIN DEATH.

**BRAIN LIFE :** Term used to refer to the beginning of functioning of a brain during fetal growth, as a point in which a moral person is argued to begin. It is the opposite of brain death. (DM)

**BRAINSTORMING:** A stage of rapid production of ideas in which a group of minds come together with an attitude of imagination and intent to thrash out lists of options or possibilities. During the brainstorming session no ideas are criticized or considered too fanciful the elimination and selection processes come afterwards. (See IDEAS PRODUCTION) (MP)

**BRAINWASHING:** See PROPAGANDA.

**BRCA1, BRCA2 GENES.** Major breast cancer associated genes. Mutations in these genes lead to predisposition to breast and ovarian cancers. Their normal counterpart code for ubiquitously expressed proteins that are required for cellular proliferation, homologous recombination and DNA repair and transcriptional regulation. Since mutations in the gene are not causal for cancer development, and many different mutations have been found in the different populations at risk so far analyzed, counseling in female carriers of mutations is a delicate issue. Scientists from the University of Utah and the US company Myriad Genetics discovered the gene in 1994. A patent has been received by them for normal gene sequence, various mutations and diagnostic tests, which has raised controversy. (GK, JA).

**BREAD:** (Old Teutonic: *brot* 'piece of loaf') Staple food made of usually leavened moistened flour, kneaded and baked. As the basic dietary component going back thousands of years, humans have enjoyed a special cultural and spiritual relationship with bread. We need a high glucose intake for our brains and cereal metabolism is the best way to secure this; thus as the single most consumed foodstuff it also serves as



a widespread symbol supporting livelihood - "Give us our daily bread" or "Bread winner" and of friendship or hospitality "Break bread" (Old Teutonic *brot* piece of loaf). (IP)

**BREAST CANCER.** One of the most frequent cancers in wealthy countries. Many genes contribute to its development. To date, two of the high risk factor genes have been cloned, whose mutations have been associated to the development of the disease in family as well as sporadic forms of the disease. (See also BRCA1 and BRCA2. ) (GK)

**BREADTH OF COVERAGE:** See DEPTH OF COVERAGE.

**BREEDING** : Biological process of producing a progeny with desired trait in plants and animals under specific conditions. Involves identification and control of human of human-use-value traits in further offspring. Enhancement of recognizable trait by human selection yielding improved varieties/breeds, e.g. Color, height, yield; or to yield better products e.g. good barley to make whisky. Compare to - **Back cross** - cross breeding of F1 hybrid offspring with one of the parents varying in their toxicity; **Crosses** - breeding different parental stocks. (JA)

**BRIBERY** : 1. the offering, giving, receiving or soliciting of something of value for the purpose of influencing the behavior of a bureaucrat, voter, legislator or sheriff in the discharge of his or her public or legal duty 2. receiving undue reward in return for exploiting his or her proper behavior in office. In common law the gist of the offence is the tendency to pervert the course of justice. (IP)

**BROWN GALL DISEASE:** Is caused by the bacterium *Agrobacterium tumefaciens* - a portion of the plasmid DNA is transferred into the cell Ti plasmid can be transferred to a plant cell so as to form a gall. (See Ti PLASMID). (JA)

**BSE:** See BOVINE SPONGIFORM ENCEPHALOPATHY.

**BST:** See BOVINE SOMATOTROPIN.

**Bt** : Acronym of Bacillus thuringiensis, produces a crystal endotoxin, protoxin, gut poison. Produces insect resistance protein, other variety of toxins. (JA)

**BUCKMINSTERFULLERENE:** Buckminsterfullerene is a hollow spherical molecule like a soccer ball made from carbon atoms. They are also known as 'buckyballs', and name fullerene (C<sub>60</sub>) is possibly the most symmetrically 'round' molecule in molecular electronics and nanotechnology. (See FULLERENES, NANOBOT, NANOTECHNOLOGY, MOLECULAR ELECTRONICS) (MP)

**BUDDHA** Title of Gautama Shakyamuni, born in Nepal, approx 6th century bce. Gautama was born to a wealthy family, and at first his parents shielded him from the unpleasantness of the outside world. However, eventually Gautama was faced with real-life examples of sickness, poverty, old age and suffering. These things troubled him, and he set out to examine the problem of suffering in the world and how to eliminate it. A key point in his teaching is that if an individual is unable to break free from the cycle of suffering in this lifetime, that individual is reborn to continue the quest for the release from suffering. (see KARMA) Buddha's teachings focus on the problem of suffering, its causes, and ways to reduce and eliminate it. In a more general sense, the term "buddha" is applied to other individuals who have managed to achieve the release from the cycle of suffering. (AG)

**BUDDHISM** Belief in the philosophy of Buddha and the lifestyle based upon it. Two major branches of Buddhism are Theravada (school of the Elders) and Mahayana (lit. "Great Vehicle"). (AG)

**BUFFER ZONES:** Intervening areas of natural vegetation which provide National Parks and other forests protection from edge effects and the encroachment of other impacts. Buffer zones are important to reduce habitat fragmentation and demonstrate good environmental management policy outside parks and preserves. They provide wildlife corridors and improve the aesthetic values of suburban and rural landscapes. (See WILDLIFE CORRIDORS, EDGE EFFECTS, HABITAT FRAGMENTATION, MULTIPLE USE ZONES) (MP)

**BUG:** 1. An error in computer programming, for example incorrect coding of an instruction (syntax error) or instructions unable to provide the required solution to a particular problem (logic error). (See DEBUG, PROGRAM, COMPUTER VIRUS). 2. A tag or sensor such as a microphone or locator, usually covertly placed for the purposes of spying and strategic surveillance. Sensor networks and 'smart dust' are in thying invertebrates, especially beetles (Coleoptera) and cockroaches (Blattodea). (See COLEOPTERA) (MP &IP)

**BULIMIA NERVOSA:** (Greek: *bous* 'ox' + *limos* 'hunger') An eating disorder - also called binge eating - characterized by recurrent episodes of binge eating and a feeling of lack of control of eating behavior during eating binges which are interspersed by self-induced vomiting, use of laxatives or diuretics, dieting and rigorous exercise all to prevent further weight gain. Bulimia may cause hormonal disorders followed by depression, disturbed menstrual cycles and fertility problems (Greek *bous* ox + *limos* hunger) (see ANORXIA NERVOSA; OBESITY). (IP)

**BULLY:** 1. a person who browbeats smaller or weaker people 2. *Archaic* : a man hired to do violence. (IP)

**BURIAL:** Placing of the body in the ground after death. This method of showing respect for the human body has been practiced since ancient times in many cultures around the world. It is the preferred method of dealing with the human body after death in Jewish, Muslim and many other traditions. Burial sites have been found around the world from prehistoric times onward. In many traditions, a place where humans are buried is a sacred site, or a site which is to be avoided. In Jewish tradition, the kohen (priest) is forbidden to approach a burial site, except in the case of the closest relatives and a person who has no relatives, and therefore has no one to look after burial procedures. (AG)

**BUSH** : in Australia and Africa represents the wild uncultivated indigenous forests and scrublands - countryside left in its native state; hence, 'go bush' or escaping one's usual surroundings for the natural landscape; that is, running wild. (See BUSH MEDICINE). (IP)

**BUSH MEDICINE** : The total sum of Australian Aboriginal knowledge accumulated over thousands of years in the use of indigenous plants and herbs with curative properties. On the whole, plant remedies represent a universal and continuous form of medicine with its chief therapeutic products becoming any nation's specific "folk medicine". Australian bush medicine is based on word-of-mouth; that is, the digenous plant used in bush medicine has specific meaning and effects, either in isolation or plant remedies that compensate for one another's undesirable properties. For example, a laxati eucalypt ingredient to improve the taste. Simiing metabolic activity. The basic assumption be influences of natural organic substances essen terms of proportions rather than measured amounts providing a relative simple holistic treatment in harmony with life and Nature - something that modern medicine lacks.

Since the accepted wisdom behind bush medicine is that the body is capable of healing itself once the proper conditions are provided, treatment remedies are designed to neutralize and eliminate from the body the harmful substances that impair its power to heal itself. Of course

this kind of wisdom, which has been largely lost and replaced by modern - European mostly - beliefs and by synthetic pharmaceuticals, is common to many traditional remedies. However, in a new spirit of inquiry into Aboriginal heritage, the therapeutic property of Australian plants has become an important topic of study, documentation and retrieval of lost knowledge. In future the best of traditional Australian medicine may comfortably co-exist with the best of western-style medicine - there is space for both. (See BUSH, HERBALISM, HERB, NUTRITION, HERBAL MEDICINE, NATUROPATHY, AUSTRALIAN ABORIGINAL, RECONCILIATION, DREAMTIME OR DREAMING). (IP)

**BY-CATCH:** The accompanying organisms contained in a fishing catch which are incidental to the targeted effort. By-catch comprises a large proportion of the catch from commercial fish and prawn trawlers, impacting for example juvenile fish, invertebrates, turtles, coral and benthos. The portion of the by-catch returned to the sea, mostly dead or dying, is termed the discard catch. Technology and regulation help reduce ecological impacts, for example closure of trawling in estuaries to allow stock replenishment, catch-excluding devices for turtles and other animals, selective fishing gear, and a culture of catch-and-release. ( See **SUSTAINABLE FISHING, DRIFTNETS, FISHING QUOTA**) (MP)

**BYTE :** A subdivision of a word in computing; that is, the number of bits representing a single character such as a letter or number. (See CHARACTER). (IP)

## C

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<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**CADAVER:** A dead body.

**CADAVER TRANSPLANTS :** Transplants of tissue derived from a cadaver. (See also ORGAN DONATION, ORGAN TRANSPLANTATION). (DM)

**CADAVERIC:** Adj., tissue derived from a dead body/tissue/foetus. (JA)

**CAESARIAN :** (Latin *Caesar lex* 'Caesar's law'). The surgical removal of a fetus through an incision in the pregnant woman's abdominal tissue and uterine wall. In the first labor, the most common reason for caesarean delivery is when the fetus is too large or the pelvis too small for a safe vaginal delivery (a condition known as cephalopelvic disproportion). The second most common reason is fetal distress and abnormal presentation, such as breech and transverse lie. Although the risk of caesarean delivery increases slightly with each procedure, it is considered that there is no limit to the number a woman can undergo. (DM+IP).

**CAFFEINE:** (Arabic *qahwah* "coffee") a bitter crystalline alkaloid drug,  $C_8H_{10}N_4O_2 \cdot H_2O$ , obtained from coffee, tea, some cola beverages, chocolate and certain stimulant pharmaceuticals. Caffeine - the most consumed drug in the world - is a central nervous stimulant and can be prescribed to counteract migraine, drowsiness and mental fatigue. It should be used with caution in individuals with heart disease and peptic ulcer and avoided or reduced to no more than the equivalent of 1-2 cups of brewed coffee per day when trying to conceive and during pregnancy. Concerns about adverse effects on health have increased the popularity of decaffeinated coffee or DECAF. (IP)

**CALCULUS :** The branch of mathematics that deals with the differentiation and integration of functions; for example, calculus can be used to find the rate at which the velocity of a body is changing with time at a particular instant, or in reverse process finding the end result of known continuous change. (IP)

**CALORIE :** (Latin *calor* 'warmth'). A unit of energy approximately equal to 4.2 joules. The small calorie (cal) is defined as the amount of energy needed to raise the temperature of one gram of water by one degree Celsius at atmospheric pressure. A kilocalorie (Cal) - also called large or great calorie - is defined as the amount of energy needed to raise the temperature of one kilogram of water by one degree Celsius at atmospheric pressure and is the unit used to denote the heat expenditure of an organism, and the energy value of food. It should be noted, however, that since the specific thermal capacity of water changes with temperature, these definitions are not strictly accurate. (IP)

**CANCER :** (Latin *kan'ser* 'crab') is not a single disease, but many different diseases with a common characteristic - abnormal growth, division and proliferation of cells which, given time, metastasize (spread) from their site of origin to distant parts of the body. The transformation of normal cells to cancerous cells is believed to reside in alterations in DNA but many potential causes are recognized with the mechanism of action not clearly understood. A mass of cells growing independently of their previous function is called a tumor or neoplasm. Not all neoplasms are malignant (cancerous) as some tumors are benign but not necessarily risk-free. There are many causes of cancer apart from the general wear and tear of cells due to aging. Prominent are chemical carcinogens such as tobacco smoke, industrial carcinogens such as asbestos, ionizing radiation which can induce leukemia and thyroid cancer, and viruses such as the hepatitis B virus which is associated with liver cancer and the human papilloma virus associated with cancer of the cervix. Typically, cancer is a disease of the elderly, however, lung and breast cancer among younger women is on the increase. Cancer is not inevitably fatal if identified and treated early. (See METASTASIS; TUMOUR NECROSIS FACTOR). (IP)

**CANE TOAD:** The large South American toad *Bufo marinus*. A failed example of biological control, the cane toad was introduced into north-eastern Australia as a predator of sugarcane pests, but became a more significant pest in its own right. The range of the toad is now from the mid-NSW coast to the Kakadu World Heritage Area, competing for habitat with native frogs and causing predators to be poisoned. (See BIOLOGICAL CONTROL) (MP)

**CANNABIS :** (Greek: *kannabis* "hemp"). The hemp plants *Cannabis sativa* and *Cannabis indica*, or their flowering buds and leaves. Hemp fibers are a multi-purpose material useful for the production of a broad range of products. The exuded resin, dried flowers and leaves are used to produce the drugs hashish (purified extract) and marijuana - popular for their euphoric effects. (See HEMP, MARIJUANA, HASHISH, DOPE, THC). (IP)

**CANOPY:** The uppermost layers of foliage and branches of the trees in a forest community, especially in the tropical rainforest where they join to form a continuous habitat with a large specialized biodiversity (See TROPICAL RAINFOREST) (MP)

**CAPACITY BUILDING:** A term widely used in humanitarian international development and reconstruction, 'capacity building' refers to the capacity for self-help support, to security and good governance. (See PEACE BUILDING, DEVELOPMENT, FOURTH WORLD, MINORITY GROUP, EMPOWERMENT) (MP)

**CAPITAL PUNISHMENT:** The killing (e.g. by hanging, electrocution, lethal injection or shooting) of a convicted criminal. A significant number of countries have by now outlawed capital punishment and those which still practise it use it for fewer crimes, often only murder, than was once the case. Often cited intrinsic arguments against capital punishment include the assertion that only God has the right to take human life. However, in some societies a significant proportion of people don't believe in God, and, anyway, many religions permit people to be killed in certain circumstances, e.g. in war. One intrinsic argument in favour of capital punishment is that the right punishment for certain crimes - e.g. murder, treason or piracy - is to forfeit one's life. There are also consequentialist arguments both for and against capital punishment. Indeed, much of the information that would be needed to reach a rigorous consequentialist conclusion is uncertain. For example, does capital punishment act as a significant deterrent to crime and how often is the wrong person killed under capital punishment? (MR)

**CAPITALISM :** Capitalism is any economic system in which people make money out of other people's labour. It is generally the goal of capitalists to make as much money as possible by paying the labourer just a little less than one needs to support a family. But labour movements have forced employers, under threat of strikes, sometimes violent, to be more generous in their salaries. It used to be thought that socialism was the opposite of capitalism. But deeper analyses (such as by movements like the Industrial Workers of the World) pointed out that the leaders of socialist communities or societies are also living off the work of others, but calling themselves "leaders" or "managers" or "statesmen" rather than "capitalists". (FL)

**CARBON:** Sixth **ELEMENT** (q.v.) in the Periodic Table. Along with hydrogen, oxygen, nitrogen and a few other elements, carbon is an essential constituent of all known life. Chemicals with more than just one or two carbon atoms are said to be 'organic'. All other chemicals are inorganic. (MR)

**CARBON-BASED ELECTRONICS:** See MOLECULAR ELECTRONICS

**CARBON CHEMISTRY:** See ORGANIC CHEMISTRY.

**CARBON CREDITS:** See ENVIRONMENTAL COMPENSATION, GLOBAL WARMING.

**CARBON CYCLE:** The redistribution of carbon between organisms and the atmospheric, oceanic and terrestrial compartments. The cycle is primarily driven by the action of biological processes such as the removal of carbon from the atmosphere during photosynthesis and its return to the atmosphere during respiration. Human utilization of fossil fuels such as oil, natural gas and coal, have resulted in carbon dioxide being produced and released into the atmosphere faster than it is being removed by living organisms (see CARBON, GREENHOUSE EFFECT, NITROGEN CYCLE, PHOSPHORUS CYCLE). (MP)

**CARBON DATING:** See RADIOCARBON DATING.

**CARBON DIOXIDE :** (Chemical formula  $\text{CO}_2$  ; Latin *carbo* 'coal' + Greek *dis* 'twice' and *oxys* 'sharp'). A colorless, odorless gas produced naturally by the complete oxidation of carbon. It occurs in the atmosphere 0.03% and is found in solution in sea-water and rivers.  $\text{CO}_2$  plays

an essential part in metabolism and ecosystem stability - a waste product of cellular respiration (carbohydrate and fat metabolism) utilized by plants during photosynthesis. That is, plants absorb carbon dioxide to obtain the carbon needed to build their tissues while plants and animals expel the gas as a product of food oxidation. In its solid form (dry ice) it is used in the treatment of some skin conditions. It is also used in fire-extinguishers, aerated water and in the bakery industry where bubbles of carbon dioxide liberated by yeast (or baking powder) in the dough lightens the dough rendering it more palatable. (See PHOTOSYNTHESIS, RESPIRATION, CARBON FIXATION, GLOBAL WARMING, GREENHOUSE EFFECT). (IP)

**CARCINOGEN:** Substance that causes or increases the risks of developing cancer. (See Cancer ). (DM)

**CARDINAL NUMBERS :** Whole numbers such as 1, 2, 3 ... that are used for counting or for specifying the total number of items. (IP)

**CARDINAL VIRTUES:** The traditionally primary virtues of prudence, justice, fortitude and temperance. (See VIRTUES) (MP)

**CARDIOVASCULAR DISEASE :** (Greek *kardia* 'heart'). Any abnormal condition characterized by the dysfunction of the heart or blood vessels such as arteriosclerosis, rheumatic heart disease and systemic hypertension. In affluent western societies such as the USA and Australia, cardiovascular disease is the leading cause of death. (See STRESS; DISEASES OF ADAPTATION; GENERAL ADAPTATION SYNDROME). (SG2+IP)

**CARING:** With the rise of **VIRTUE ETHICS** (q.v.) a caring person is increasingly recognised in ethics as a particular instance of a good person. Caring is not to be equated with **BENEFICENCE** (q.v.), having a more relational quality to it. **FEMINISM** (q.v.) has seen caring as a central human virtue yet one that has traditionally been undervalued both in academic ethics in particular and in patriarchal societies more widely. It has been strongly argued that caring is central to such professions as nursing and teaching. (MR)

**CARRIER :** Someone who may transmit a recessive genetic condition but who normally does not show any evidence of the disease (DM). It is possible to distinguish two types of carriers, sex-linked and autosomal carriers. In the first case, only women are carriers, and may transmit the disease gene to either sex of her children, but only boys will be affected in a ratio of 1 in 2 (50% chance). In the second case, if both parents are carriers of a mutant gene, any child has a chance of 1 in 4 (25%) to suffer the disease (GK).

**CARRIER TESTING :** Used to detect individuals who possess a single copy of a gene which follows an autosomal recessive pattern of inheritance. Such an individual will not normally develop any disease or disorder but may pass on the gene to his or her offspring.

**CARRYING CAPACITY:** Carrying capacity (represented by the symbol K in ecology) is the maximum population density able to be sustained by an environment for a prolonged period of time without causing lasting damage or degradation. The concept also has applications to human ecology, for example in international development, food production or ecotourism management. (See SUSTAINABILITY, LIMITS OF ACCEPTABLE CHANGE) (MP)

**CARSON, RACHEL:** (1907-1964). Biologist and writer whose 1962 book *Silent Spring* has widely been hailed as heralding the environmental movement in the West. Carson initially specialised in English but her ambition to become a writer was initially overcome by her interest in natural history. For much of her working life she was genetic biologist and then editor-in-chief for the US Fish and Wildlife Service.

In *Silent Spring* Carson presciently argued that chemical pollution, particularly through the widespread use of agricultural pesticides, was both killing wildlife and upsetting the balance of nature. (MR)

**CARTEGENA PROTOCOL OF THE BIODIVERSITY CONVENTION** : Ratified by fifty countries, this international treaty came into force on 11 September, 2003. It regulates the inter-country transfer of LMOs and GMOs. (DM)

**CASUISTRY**: A method of ethical analysis that emphasizes practical problem-solving through examining individual cases that are considered to be representative. (DM)

**CATALYST** : 1. A chemical which remains unchanged but acts to initiate or increase the rate of a chemical or biological reaction. 2. More generally, a catalyst may be any substance, course of action or idea which initiates or increases the efficiency of any process of change. (See **ENZYME**) (MP)

**CATHEKONIC ETHIC** : A philosophical principle that deals with the relationship between parts and the whole. (JA)

**CATHOLIC**: Universal. So, strictly, the Catholic Church is either the whole body of Christians or the whole Christian Church before it separated into the Greek (Eastern) and Latin (Western) branches. In practice, though, the Catholic Church is widely understood as the Roman Catholic Church, namely that part of the Latin Church which remained under Roman authority after the Reformation. Roman Catholic theology has been and remains important in much medical ethics, for example with regard to the **PRINCIPLE OF DOUBLE EFFECT** (q.v.) and such issues as **ABORTION** (q.v.), **CONTRACEPTION** (q.v.) and **EUTHANASIA** (q.v.), with Roman Catholic teaching being strongly and consistently against all three. (MR)

**CAUCASIAN** : a term once used to describe an appearance including light skin and straight light to brown hair; that is, generally meaning of European descent. (See **RACE**; **RACISM**). (SG2)

**CAUSATION**: An interaction which produces or brings something about, pertaining to the cause and effect relation. Causes have consequences; affects have effects; act-contact-impact over time. Causation implies a pre-impact *necessary connection* and *constant conjunction* . Correlation or logical necessity may not necessarily indicate causation. Many things have a plurality of causes, the multitude of which leads to ‘ultimate’ causation and the freedom/determinism debate. (See **CORRELATION**, **AFFECT**, **EFFECT**, **PROOF**, **ENVIRONMENTAL IMPACT**) (MP)

**CBD** - see **CONVENTION ON BIOLOGICAL DIVERSITY** (JA)

**CELL**: The smallest component of life. Biological component of tissue - contains nucleus and cytoplasm (protoplasm). A membrane-bound protoplasmic body capable of carrying on all essential life processes. A single cell unit is a complex collection of molecules with many different activities all integrated to form a functioning, self-assembling, self-regulating, and self-reproducing biological unit. (DM)

**CELL CULTURE**: The propagation of cells removed from multicellular organisms in a laboratory environment that has strict sterility, temperature, and nutrient requirements. (DM)

**CELL FUSION**: The joining of the membrane of two cells, thus creating a single hybrid cell that contains nuclear matter from both the parent cells. (DM)

**CELL HYBRIDIZATION** a not occur naturally. (JA)



**CELL SUSPENSION:** Made by cutting bits of tissues when shaken in liquid nutrient medium forms a single cell or clusters of cell suspension and having similar property as that of adult plant/animal. (JA)

**CELSIUS DEGREE ( ° C ) :** (Swedish scientist Anders Celsius, 1701-1744). A unit of temperature difference equal to one hundredths of the difference between the temperatures of freezing and boiling water at one atmosphere pressure. On the Celsius scale water freezes at 0°C and boils at 100°C. Also called centigrade. (See FAHRENHEIT, TEMPERATURE). (IP)

**CELLULAR AUTOMATA:** Software ‘organisms’ which emitable programs ‘with a life of their own’ which have biological analogues such as heredity, fecundity, symbiosis, and the rapid evolution of complexity. (See GENETIC ALGORITHMS, ARTIFICIAL LIFE, ARTIFICIAL NEURAL NETWORKS) (MP)

**CELLULAR TRANSPLANTATION :** Experimental transfer of cellular body components Eg. Blood transfusion, bone marrow /pancreatic islet cells. (JA)

**CENSUS:** 1. Statistics: a census is a survey which investigates every member of a statistical population to determine its parameters. 2. Sociology: a government- sponsored obligatory survey of all individuals in a country or region. Early censuses (from 1801 in Britain) were in the form of simple head-counts, but today census forms ask for a wide range of personal and household information. Privacy and trust issues make it preferable that the census be anonymous. Census data may be disaggregated to provide localized political, academic and market research. Social statistics are an important resource for investigating trends in social well being, stratification and sustainability. (MP)

**CENTIGRADE :** See CELCIUS DEGREE (°C).

**CENTENARIAN:** A person who has reached the age of one hundred years. (See LIFE EXTENSION) (MP)

**CENTIMORGAN:** A unit of measure of genetic recombination frequency. One centimorgan is equal to a 1 percent chance that a genetic locus will be separated from a marker due to recombination in a single generation. In human beings, 1 centimorgan is equivalent, on average, to 1 million base pairs. The recombination frequencies between two loci on a chromosome are not the same in both sexes, and may be quite different from one chromosomal region to the other. Therefore, genetic distances measured in centimorgans are just an approximate measure of the physical distance as measured in base pair units. (DM+GK)

**CENTRAL NERVOUS SYSTEM (CNS) :** The major coordinating components of the nervous system and associated nerve cords, normally including the cerebral ganglia (brain) and ventral nerve (spinal cord). (See BRAIN, NEURON, AUTONOMIC NERVOUS SYSTEM) (MP)

**CENTRAL PROCESSING UNIT (CPU) :** The central 'brain' of the computer, able to perform logical and mathematical operations on data and control the execution of programming instructions. (See COMPUTER, MICROCHIP) (MP)

**CENTRAL TENDENCY:** See MEASURES OF CENTRAL TENDENCY

**CENTRE FOR ASIAN AND INTERNATIONAL BIOETHICS :** A centre under the Faculty of Health Sciences, Ben Gurion University of the Negev, Beer Sheva, Israel.. The Centre conducts cross-cultural research into the foundations of ethics in Israeli and other Asian countries. It conducts a Mother and Child Health Education project, for Dalit (q.v.) village mothers in India, in cooperation with the Dalit Liberation

Education Trust, and the Delta School of Nursing, Kadalure, Tamil-Nadu. The project began with the help of Mashav, the Department of International Cooperation of the Israeli Foreign Ministry. The Centre is preparing similar projects for other locations in developing countries. (FL)

**CENTRIC** : Adj. Mode of living in line with the centrality given to a concept/person. See CENTRISM. (JA)

**CENTRISM** : A model of concentric importance, giving a centrality of living/placing an object/person/concept a central guiding force, other life activities are determined/controlled/regulated in terms of such a centrality of living. Eg. Theocentrism (God centred), biocentrism (life), ecocentrism (green technology), Anthropocentrism (human), webcentrism (computer). (JA)

**CENTROMERE**: The small junction area between the two arms of a chromosome. (DM+GK)

**CERES**: Coalition for Environmentally Responsible Economies.

**CEPH-GENETHON (Centre d'\_tude des polymorphismes humains)**. French cell and DNA bank keeping a collection of DNA samples and immortalized cell lines from 58 Caucasian family donors. The families representing the panel have large kindred (6 children) and 4 living grand-parents, accounting for 1.212 meioses. It has also developed a high density microsatellite physical map for each human chromosome, suitable for linkage analyses. (GK)

**CEPHALOPODA** : Members of the mollusc class Cephalopoda include the nautilus, cuttlefish, squid and of course the octopus, generally considered to possess the greatest intelligence of invertebrate organisms. (See MOLLUSCA) (MP)

**CERVIX**: (Latin *cervix* "neck") that part of the uterus that protrudes into the cavity of the vagina - also called the "neck of uterus". Cancer of the cervix is a major cause of death among women (see CERVICAL CANCER; CERVICAL MUCUS; OVULATION METHOD OF FAMILY PLANNING). (IP)

**CERVICAL CANCER**: a neoplasm (abnormal development of cells that may be benign or malignant) of the uterine cervix that can be detected in the early, curable stage by the Papanicolaou (Pap) smear test. If left untreated cervical cancer invades the adjacent tissues and organs and eventually metastasizes through lymphatic dispersal. Carcinoma *in situ* , on the other hand, may be easily treated by excision or cryosurgery. Factors, which may be associated with the development of cervical cancer, are coitus at an early age, relations with many sexual partners, genital herpesvirus infections, multiparity, and poor obstetric and gynecologic care (see PAP SMEAR TEST). (IP)

**CERVICAL MUCUS**: a secretion of the lining of the upper portion of the cervical canal of the uterus. The mucus' consistency and appearance changes throughout the menstrual cycle. Around the time of ovulation, the volume of mucus increases and becomes thin, clear elastic, and easily penetrable by sperm; during the infertile periods of the menstrual cycle the mucus is thick and less penetrable to bacteria and sperm. The cervical-mucus method of birth-control is based on the detection of this change in the vaginal mucus in order to avoid intercourse during the likely fertile period. (IP)

**CESAREAN** : see CAESARIAN

**CHAKRABARTY VS DIAMOND CASE** : The famous Diamond V Chakrabarty case in 1980 deals with the patenting of a genetically modified "crude oil eating" bacterium. The Se in nature and has the potential for significant utility value in environmental protection and cleaning. (JA)

**CHAIN REACTION:** A self-sustaining series of reactions, in particular those of nuclear fission in which the particles released by one nucleus trigger the fission of at least as many further nuclei. (See CRITICAL MASS, CHINA SYNDROME, RADIOACTIVITY, NUCLEAR FISSION) (MP)

**CHANGE:** (See TIME, PROCESSES)

**CHAOS THEORY:** The notion in the natural sciences that a very small change in a system may have massive, unpredictable consequences. Memorably summed up by the 'Butterfly effect' in which it is possible, though of course, not certain, that the beating of a butterfly's wings in one part of the world may lead, a few weeks later, to a storm thousands of miles away. The indeterminacy of **Heisenberg's Uncertainty Principle** (q.v.) and chaos theory effectively ended belief in a Newtonian, determinate world-view in which an accurate description of a system allows its future to be predicted absolutely. Nowadays, for example, scientists predict that however accurate our measuring instruments and powerful our computers we will never be able to predict local weather variations more than a couple of weeks ahead. (MR)

**CHARACTER** : One set of symbols such as a letter, number, punctuation mark or symbol that can be represented in a computer. A character is stored and manipulated in the computer as a group of bits. (See BYTE). (IP)

**CHASTITY BELT:** a lock-and-key device said to be worn by some women in the Middle Ages to cover their genitals to prevent sexual intercourse during their husband's absence in battle etc. Similar devices have been discovered in the Caucasus and among the Cheyenne First Nation people in America. The use, if indeed they were made use of, of these devices epitomizes negative societal attitudes towards women by emphasizing their belonging - property of - another. (IP)

**CHEMICAL POLLUTION:** See POLLUTION.

**CHEMISTRY** : The study of the states, reactions, and products of elements and compounds. (RW)

**CHEMOSYNTHESIS:** The formation or synthesis of organic nutritive substances in plants or animals by the use of energy derived from simple chemical reactions. For example, anaerobic bacteria such as the methanogens which live within the decaying sediments of bogs and marshes and produce methane gas. (See ANAEROBE, PHOTOSYNTHESIS) (MP)

**CHEMOTAXIS** the process whereby bacteria that possess flagellae for propulsion sense a concentration gradient of a chemical substance in the medium and move either toward or away from it (see TAXIS). IP

**CHEMOTHERAPY** the treatment of diseases with chemical agents. The procedure involves the exploitation of biochemical differences between the disease process and the host tissue in order to interfere selectively with the disease process; for example, in selectively destroying cancer cells. Modern biochemical pharmacology is based on designing specific inhibitors targeted to discriminate against a metabolic process that is specific to the pathological condition. (IP)

**CHERNOBYL:** A city in the Soviet Republic of Byelorussia and the site of the world's most disastrous nuclear accident in April 1986. The nuclear energy red radiation-related ailments such as endocrine/immune system problems and birth defects. (See CHINA SYNDROME, NUCLEAR FISSION, RADIOACTIVITY, THREE MILE ISLAND, BHOPAL) (MP)

**CHI-SQUARE TEST** : A measure of how well a theoretical probability distribution fits a set of data. The test is typically used in analyzing experimental data with standard normal distributions. (See ANALYSIS OF VARIANCE, SCIENTIFIC METHOD, STATISTIC). (IP)

**CHILD ABUSE**: physical, sexual, or emotional mistreatment of an infant or child by any adult or adults. Major therapeutic and statutory concerns are identifying dysfunctional family members, friends or relatives and the children at risk. A duty of care falls on any individual who is confronted with children with obvious physical signs (the "battered-child syndrome") such as burns, welts, bruises, frequent physical mishaps/fractures, suspected sexual molestation, or signs of emotional distress and overall failure to thrive. Characteristically, abuse may be seen as the final behavioral consequence of multiple factors compounded by a variety of stressful circumstances; such as drug abuse, lack of emotional support within the family unit or lack of nurturing experience, possibly by victims of child abuse themselves. Child Sexual Abuse is the involvement of dependent, developmentally immature children and adolescents in sexual activities to which they are unable to give informed consent, and which violate the social taboos of family responsibilities. Despite recent insights, there still remain a large number of uncertainties and confusions surrounding child abuse. To some degree, this may be due to the particular protection society affords to "family business" and problems adults have in dealing with sexuality in themselves and in children. Additionally the area of child abuse is difficult to research objectively because it raises issues about power, secrecy, shame and guilt. (See ABUSE; elder abuse ; DRUG ABUSE). (IP)

**CHILD NEGLECT**: See CHILD ABUSE.

**CHILD SEXUAL ABUSE**: See CHILD ABUSE.

**CHILDREN** : In the US it is the age designation for humans 2-12 years old . (DM)

**CHILDREN WARRIORS**: See CHILD ABUSE, CRIMES AGAINST HUMANITY.

**CHIMERA**: An organism formed by the aggregation of cells taken from different genotypes. Chimeric embryos may occur naturally or artificially. An inter-species chimera is when the cells are from different species. Combination of unrelated species, ancient mythical gods with human-lion, human horse, human monkey, human-elephant head combinations in Hindu and Greek mythology. Insertion of foreign animal genes in plant/human in a particular species. Cell fusion of two species, Sheep-goat resulting in a Geep. See GEEP.

Ethical questions include - is it a sheep with pig genes, or is it a sheep or a pig? What percentage determines a species in transgenic? Is a human body with a pig head human or a pig? It dilutes the concept of speciation. (DM, JA)

**CHINA SYNDROME**: A term used to describe a catastrophic nuclear energy reactor core meltdown, in which the radioactive fuel would melt unstoppably into the earth, colloquially "all the way to China". Chernobyl was a ho (See CHERNOBYL, THREE MILE ISLAND, NUCLEAR FISSION, CHAIN REACTION) (MP)

**CHINDOGU**: A Japanese word for those practically useless consumer goods which are nevertheless commonly produced and purchased by the wealthy as a result of the temptations of glossy advertising. Chindogu may include novelty items, unwanted gifts, technological gizmos and other wasted resources. (See CONSPICUOUS CONSUMPTION) (MP)

**CHLORDANE** : Chlordane, also known as Octachlor, is a dangerous chlorinated hydrocarbon pesticide, one of the 'dirty dozen' persistent organic pollutants. (See PERSISTENT ORGANIC POLLUTANTS) (MP)

**CHLORINATED HYDROCARBONS** : Persistent organic pollutants including DDT, Dieldrin, Aldrin, Endrin and Chlordane used as

pesticides but today maligned and phased out across much of the world because of their medical/ecological impacts such as toxicity and bioaccumulation. (See PERSISTENT ORGANIC POLLUTANTS) (MP)

**CHLOROFLUOROCARBONS OR CFCs:** Volatile compounds commonly known as "Freons". The chemicals have been used in association with refrigerant fluids, solvents, aerosol propellants and blowing agents in the fabrication of foam plastics. Their extraordinarily high stability enables them to persist in the atmosphere and to enter the stratosphere where they are the major culprit in ozone layer depletion (see OZONE HOLE). Lag times before the effects of human-driven change emerge can often be long; for example, CFCs released into the atmosphere now will damage the ozone layer in thirty to eighty years time, risking a false sense of safety. (IP)

**CHLOROPLAST:** Those structures within plant cells where photosynthesis occurs. They contain small circular DNA molecules that replicate independently of the nucleus. (DM)

**CHOICE:** See SCIENCE OF CHOICE.

**CHORDATA :** The bilaterally symmetrical animal phylum characterized by the presence of a flexible, rod-like notochord during at least some stage of development. The notochord serves as the main internal structural element in primitive chordates, but develops into a true backbone in others, such as the Vertebrata. (RW)

**CHORIONIC VILLI:** Finger-like projections growing from the external surface of the chorion that contribute to the formation of the placenta. (DM)

**CHORIONIC VILLUS SAMPLING (CVS):** The procedure used in prenatal diagnosis to take a small sample of the chorionic villi for testing, such as genetic screening. (DM)

**CHRIST, JESUS:** Central figure of the Christian faith, understood in a unique way as God's Son and, along with God the Father and the Holy Spirit, as one of the Trinity. Seen by some other faiths as a great prophet. (MR)

**CHRISTIAN ETHICS :** System of belief about right and wrong actions and attitudes derived from, or at least strongly influenced by, Christianity (faith in Jesus, the Christ as the one son of God). Much Christian ethics derives from scripture, so discussions / disagreements among Christians about such matters as divorce often cite particular verses in the bible that deal with the issue. Many of today's ethical issues, of course, lack much or any specific scriptural reference – e.g. genetic engineering, euthanasia, cloning, and the conservation of endangered species. Christian ethicists typically still draw on more general scriptural principles – e.g. about the place of God in creation, and stewardship – as well as reason and tradition when debating such issues. (MR)

**CHRISTIANS :** The disciples of the Lord Jesus Christ were called Christians in the city of Antioch (Bible. Acts. 11:26). Their life style was so unique that King Agrippa replied St Paul " Do you think that in such a short time you can persuade me to be a Christian" (Acts. 21:28). Till about 300 AD, Christians were persecuted (1 Peter 4:16) like the people living in Cappadocia (now in Turkey). Although there are two major divisions, namely Protestants and Roman Catholics, these groups are not found in the Bible, there are now many sects among Christians, which are based on minor doctrinal differences. (JA)

**CHROMOSOMAL ABNORMALITIES:** Congenital disorders or genetic mutations involving changes in the number and structure of chromosomes. (see DOWN'S SYNDROME, XYY KARYOTYPE) (DM)

**CHROMOSOMAL DISORDERS :** See CHROMOSOME ABNORMALITIES.

**CHROMOSOME:** chromo (clor) soma (body), stains with basic dyes. Specific to each species. A structure that lies inside a cell's nucleus. A

chromosome is composed mainly of DNA. Each normal cell of the human body has 23 pairs of chromosomes. The organelle found in which they are found is the nucleus, containing DNA 23 pairs in human being. See KARYOTYPE, AUTOSOME. (JA)

**CHRONICALLY ILL** See CHRONIC DISEASE, CRITICALLY ILL, DISABLED, REHABILITATION, TERMINALLY ILL.

**CHRONOCENTRISM:** (From the Greek "chrono-"= time + center+ ism) A belief or viewpoint which holds that a particular time period is better than others, and that the society which lives in that time period is superior to societies which live/d in other time periods. During the 20th century, many new terms were coined to acknowledge the growing awareness that being self-focused (either as an individual or as a group) has negative aspects, and that there are multiple viewpoints and perspectives that need to be recognised. The terms "racism", "sexism", "antisemitism", and "ageism" demonstrate examples of discrimination applied to certain groups of people, based upon the conditions of their birth, whether gender, ethnicity, race or religion are a factor. The coining of "ageism" also shows awareness of a person's age and how that affects the way that person is viewed in society. There is also recognition of the problem of discrimination of people with disabilities of various sorts. However, there is another subtle form of self-centered thinking, which has not been acknowledged with a special term, and this is why the term "chronocentrism" is being offered.

It is difficult to claim that chronocentrism is a form of discrimination in the usual sense of the word. The reason is that generally chronocentrism is applied towards people who are not currently alive. Chronocentrism is not quite the same as discrimination against people who were born earlier, and thus lived their formative years in a different societal and technological setting. It is also not quite the same as discrimination applied towards a traditional society that is considered "backward". In both cases, the discrimination is applied to people, and the negative attitude towards those people's ideas is given as the reason for the discrimination. However, in the case of chronocentrism, the negative attitude is applied to a society, rather than towards a particular person. That society is held to be "inferior" to one's own. In some ways, this parallels negative attitudes towards foreign societies that are contemporary with one's own. However, in the case of chronocentrism, the negative attitude is applied even towards one's own society of a different time period. While this does not have a direct affect on a particular human being, it can have affect on a large number of people, because chronocentrism is directed at the values and lifestyle of society. Derivative forms include "chronocentric" for an adjectival form, "chronocentrist"- "one who practices chronocentrism". (AG)

**CHU HSI:** (pinyin spelling Zhu Xi) (1130-1200) Confucian scholar and philosopher. His most influential work included commentary of the classical Confucian texts. Zhu Xi's interpretations became the official interpretation of Confucian texts, and so, his commentaries exerted considerable influence on Chinese thought for centuries. (AG)

**CHUANG TZU:** Chinese philosopher (c.369-286 BCE). The work which bears his name, the Chuang Tzu, is one of the key philosophical texts of Taoism along with the Tao Te Ching. (See TAOISM, TAO TE CHING, LAO TSE) (MP)

**CIA:** Central Intelligence Agency (U.S.)

**CIESIN:** Center for International Earth Science Information Network (US).

**CIGUATERA:** food item that is not toxic in itself becomes toxic due to contamination - bacterial/toxic diatoms/heavy metals. (JA)

**CILIA:** Short hair-like structures on a cell or microorganism, the movement of which aids mobility of the cell and transfer of materials across its surface. (See FLAGELLA) (MP)

**CIRCUMCISION, MALE** : Practiced for religious reasons by Jews and Muslims, and for medical reasons to a large extent in the United States and Canada. Reviews conducted by committees of the Canadian Pediatric Society and the American Medical Association acknowledged some benefits of the operation for reducing sexually transmitted disease, penile cancer and neonatal urinary tract infections. But they also noted dangers of surgical error and complications. Both the benefits and the risks are statistically small, and they are close to equal. So both committees recommended against routine medical neonatal circumcision. Their reports were published, however, before more recent research suggesting that circumcision may protect against AIDS because receptors for the HIV virus are located on the inner side of the foreskin and at the point where the foreskin is attached to the penis.

There is a debate in Jewish tradition between those who believe, with Rabbi Akiva and Rabbi Saadia Gaon, that circumcision improves the baby by removing an unnecessary piece of skin, and those who believe, with Maimonides (q.v.) that nature never does anything unnecessarily, and that whatever nature does routinely (as opposed to mutations) is for the good of health. Maimonides believed that the foreskin performs a perfectly healthy function, contributing to pleasure and erectile Function, and that Jews are commanded to remove it in order to reduce sexual pleasure to no more than is needed to perform the Biblical commandment to be fruitful and multiply. There are religious Jewish movements today, associated with Reform Judaism, who want to do away with infant circumcision. (FL)

**CIRCUMCISION, FEMALE** : See FEMALE GENITAL MUTILATION.

**CIRCUMSTANTIAL EVIDENCE**: Common-sense notion of indirect information that suggests the most likely explanation for some event. For example, if a gun shot is heard from a room with only one entrance/exit and I then walk out and others then find a dead woman in the room, there is circumstantial evidence that I killed her. Of course, it could be that she killed herself, that I shot her but she was already dead, etc.. (MR)

**CITES** : Convention on International Trade in Endangered Species.

**CIVIL DISOBEDIENCE**: An individual or community action which, although is in violation of the law, acts as an expression of personal or ideological values and a democratic plea for legal change. Examples include 'Reclaim the Streets' for pedestrians and the 'Mardi Grass' for advocates of pot decriminalization. (See CRITICAL MASS, RECLAIM THE STREETS, MARDI GRASS, ACTIVISM, NONVIOLENT DIRECT ACTION) (MP)

**CJD** : see CREUZFELDT-JABOB DISEASE

**CLAIRVOYANCE**: (French: "clear-seeing") The clairvoyant is a person who claims, without apparent sensory means, awareness of events occurring at a distance or the ability to foretell future events. (See EXTRA-SENSORY PERCEPTION, TELEPATHY, PRECOGNITION) (MP)

**CLASH OF CIVILIZATIONS**: A popular term emphasizing the role of inter-civilizational differences as one of the causes of wars, cold war and international tension, for example contrasts between the dominant religious/political/ideological systems of the Sinic, Islamic and Western civilizations. Popularized by Samuel Huntington's 1997 book of the same name, the clash of civilizations hypothesis experienced a revival after the 2001 terrorist attacks upon America. Although a useful basis for peace research and the search for common philosophical ground, care should be taken not to promote the concept of a divided world. Such generalizations should not ignore the positive international effects of



multiculturalism, trade, travel and human diversity, nor the fact that civilizational differences are often merely used as an excuse to justify war - the true underlying reasons for war usually more directly involve power, territory, resources and/or economics. (See CIVILIZATION, WESTERN CIVILIZATION) (MP)

**CLASS:** (Latin: *classis* "rank") 1. Sociology: A division or classification of people by economic, cultural or social ranking, or containing members sharing common attributes. Social rank, economic stratum and cultural caste may be useful classifications for understanding socioeconomic systems, but should be broken down to bring people together rather than emphasizing difference and encouraging prejudice. (See CASTE SYSTEM) 2. Biology: The taxonomic classification of organisms below the phylum, and containing one or more orders. For example Class Reptilia, or Class Mammalia which includes humans. (MP)

**CLASSICAL MECHANICS :** A system of mechanics that is based on Newton's laws of motion; that is, the laws of bodies acted on by forces. Einstein's theory of relativity and Planck's quantum theory are not taken into account. Classical mechanics is essentially experimental and its laws are based in intuitive deduction. (See NEWTON, SIR ISAAC, NEWTON'S LAWS OF MOTION, QUANTUM THEORY, RELATIVITY THEORY). (IP)

**CLAUSEWITZ, CARL VON:** Prussian-born military officer and strategist Carl von Clausewitz (1780-1831) was the author of *On War*, considered one of the definitive collections of insights on the subject. Although his work has negligible emphasis on morality or war ethics, its contributions to the theory and nature of war include valuable insights. Clausewitz argues that politics is the source and objective of war, which is mere "continuation of policy by other means". (See INSTITUTION OF WAR) (MP)

**CLEAN PRODUCTION :** A worldwide movement towards greener production practices, 'cleaner production' (or 'clean production', emphasizing the shift towards zero impacts) includes efforts towards the minimization of resource use, ecological disruption, social impacts, industrial emissions and wasteful products or processes. (MP)

**CLEAVAGE:** The stage of cell division that takes place immediately after fertilization and that lasts until the cells begin to segregate and differentiate and to develop into a blastocyst. (IP)

**CLIA 88 :** Clinical Laboratory Improvement Amendment of 1988 by the FDA, prescribing federal regulations in genetic testing.

**CLIMATE:** Conditions of temperature, rainfall, humidity, etc. in a region. Of little ethical concern until in recent years when it has been realised that climate can be affected by human actions, as, for example, in GLOBAL WARMING (q.v.). (MR)

**CLIMATE CHANGE:** (MP & IP) (See GREENHOUSE EFFECT, GLOBAL WARMING)

**CLINICAL ETHICS :** The identification, analysis, and resolution of moral problems that arise in the care of individual patients. (DM)

**CLINICAL ETHICS COMMITTEES :** Institutional committees established to protect the welfare of patients. (See ETHICS COMMITTEES). (DM)

**CLINICAL TRIALS:** A general term for attempts to make testing of new drugs as scientific as possible. Clinical trials are the central method for applying the ideal of "Evidence Based Medicine", i.e. allowing into the physician's pharmacopoeia and clinical repertoire only those drugs and techniques which have been scientifically proved to be safe and effective. This is still far from reality, however, as it is generally understood that the majority of treatments in use today are still based upon the collective experience of the profession, and not on scientific evidence. Also, controlled clinical trials of surgical techniques lag far behind those of drugs.

After a new drug is studied in vitro and with animal subjects (a bioethical issue in itself) controlled clinical trials are performed on human

subjects, ideally with the free informed consent of the patient, although this is problematic in pediatric, psychiatric and geriatric medicine. Trials are "controlled" in that the test group may be compared with a group which receives no treatment, or with a group receiving an existing treatment, or with a group receiving a placebo. The most recent version of the Helsinki Declaration (q.v.) however, recommends using an existing treatment for comparison rather than a placebo. The bioethical reason is that patients may find that their only hope for cure is to enter a trial and take a risk of getting the placebo rather than the real treatment. This would be a form of coercion. Trials are also supposed to be "double blind" in the sense that both the physician and the patient are not supposed to know who is getting the treatment and who is getting the placebo.

Clinical trials are usually sponsored by the corporation which has invested in developing the drug, and which hopes to eventually make a profit. This can lead to many bioethical problems. For example, there is little uniformity among contracts between drug companies and physician-researchers, but some have clauses forbidding the physician to divulge to a third party or to publish information learned during the conduct of the trial, unless the drug company gives permission. A physician, whose first loyalty must be to one's patients, and to patients in general, has a bioethical dilemma when one has concluded that the drug is detrimental to the patients, but the drug company is slow about giving permission to publish this information. By the time the drug company gets around to giving permission, some patients can be hurt. Physicians who have seen their loyalty to their patients, and their academic freedom to publish data which can prevent future harm to patients, as more important than their contract with the drug company, have not always been supported by their hospitals and universities. (FL)

**CLINICAL TRIALS, INFORMED CONSENT IN PEDIATRIC, PSYCHIATRIC AND GERIATRIC :** The requirement for freely-given informed consent becomes problematic when the patient is incapable of clearly understanding and freely assenting, or when the patient's competence is on the borderline. Such cases may be more the rule than the exceptions in hospitals, where even the most sane, intelligent and well-informed patients may be in pain, in fear and under great emotional pressure. These problems are amplified when the patient is a baby, or mentally ill or a geriatric patient in or close to dementia, or when the patient is in coma. In order to allow research to proceed, the concept of a "proxy" or "surrogate" was devised. A parent of a baby, for example, or a family member of an adult incompetent patient, is allowed to give the "free informed consent" thereby preserving the ideology of "autonomy". But this is a legal and bioethical fiction.

When the treatment under trial is indicated for the clear medical benefit of the patient, then there is room for proxy assent. Obviously a parent can impose treatment (an unpleasant vaccine injection, for example) when it is clearly for a baby's good. But more attention must be paid to formulating ethics of interventional trials on healthy babies, or on other patients who are incapable of giving free informed consent by themselves. (FL)

**CLONE:** A collection of cells or organisms that are genetically identical. An identical genetic copy of an organism - animal/plant/ human being. (DM, JA)

**CLONING:** The process of asexually producing a group of cells (clones), all genetically identical to the original ancestor. In recombinant DNA manipulation procedures to produce multiple copies of a single gene or segment of DNA. The production of a cell or an organism from a somatic cell of an organism with the same nuclear genomic (genetic) characters - without fertilization. (See STEM CELLS) (DM, JA)

**CLOSED LOOP RECYCLING:** See DEEP DESIGN VALUE SYSTEM.

**CLOSED QUESTIONS:** Questions which have a restricted range of answers. In research such as social surveys this may facilitate statistical analysis. Closed questions only requiring short answers include ‘Who?’, ‘When?’ and ‘Where?’, and are not as effective in encouraging the shy communicator to speak at social occasions. (See OPEN QUESTIONS) (MP)

**CNIDARIA :** The phylum of exclusively aquatic, invertebrate animals characterized by radial symmetry, a sac-like internal cavity and nematocysts stinging cells. There are four major groups of cnidarians: The Anthozoa include the corals, sea pens, and anemones. The Hydrozoa include many medusae, the hydroids, and siphonophores. The Scyphozoa are the true jellyfish. The Cubozoa are the box jellies. (RW)

**CNS :** See CENTRAL NERVOUS SYSTEM.

**COASTAL ZONE MANAGEMENT:** (See INTEGRATED MANAGEMENT, STRATEGIC MANAGEMENT)

**COBE:** Cosmic Background Explorer satellite, launched on 18 Nov. 1989 to map radio-wave data and investigate the nature and origin of the early universe. (See SATELLITE, BIG BANG, ELECTROMAGNETIC RADIATION) (MP)

**COCA :** A species of South American shrub *Erythroxylum coca* , native to Bolivia and Peru containing a natural source of cocaine. Traditionally, the leaves are dried and chewed or prepared in coca tea for their mild stimulant effect. (See COCAINE HYDROCHLORIDE). (IP)

**COCAINE:** See COCAINE HYDROCHLORIDE.

**COCAINE BABIES:** the birth of a growth retarded infant with birth defects caused by exposure to cocaine prior to conception or during pregnancy. Direct causes may be poor sperm or egg quality of a male or female cocaine user, and/or drug-effects *in utero* adversely affecting the developing embryo and fetus. Contributing causes may be poor nutritional habits and abuse of additional substances such as alcohol and tobacco (see COCAINE HYDROCHLORIDE; CRACK; ADDICTION). (IP)

**COCAINE HYDROCHLORIDE:** a crystalline alkaloid derived from coca leaves but can also be manufactured synthetically. Traditionally used as a local anesthetic cocaine, when taken internally, is highly toxic with serious psychotropic effects. It is one of the most powerful dopamine-enhancing drugs and achieves its effect at the nerve synapse by blocking the neuron’s recycling system for dopamine; thus dramatically increasing the amount of dopamine messenger available to stimulate neurotransmission. Thro of excitability characterized by euphoria, optimism, increased energy and decreased need for sleep. The euphoric effect lasts about 30 minuttment, restlessness, incoherent speech, fever, hypertension, and cardiac arrhythmias which can lead to convulsions, respiratory arrest and ssion so frequently abuse it (see CRACK; COCA; COCAINE BABIES; ADDICTION). (IP)

**CODE:** A set of principles (see GENETIC CODE).

**CODE OF HAMMURABI:** (actually should be Hammurapi, based on Ugaritic texts) Major lawcode of ancient Mesopotamia. This lawcode is named for Hammurapi, the king 6th king of the first dynasty of Babylon (1792-50 bce). On the stele of Hammurapi, the king is portrayed as receiving the lawcode from Shamash, the sun god. The laws in the code demonstrate three levels in society: the awilum (free man), the mushkenum (the dependant, of somewhat lower status than the awilum), and the wardum (slave). Each is judged according to his social class,

and greater damages are awarded to an awilum who was injured than a mushkenum or wardum who was injured. The principle of "an eye for an eye" is applied to the extreme in this lawcode. Many of the cases in the code of Hammurapi are dealt with in the Torah as well, and so, this lawcode has become a popular source of comparison between Babylonian law and Jewish law. The text of the code is written in the Babylonian dialect of the Akkadian language. (AG)

**CODES OF CONDUCT:** See ENVIRONMENTAL CODE OF CONDUCT.

**CODES OF ETHICS :** Systems of principles or rules of ethical professional conduct, usually established by professional societies. An ethical code governs , for instance, the use of a technology or the Patient -Doctor relationship. Ethical considerations form a guideline evoking acceptable behavior based on moral values and practical experiences. It serves as a regulatory principle e.g. marketing and labeling of GM food, confidentiality in the treatment of people living with HIV and AIDS. (DM, JA).

**CODEX ALIMENTARIUS COMMISSION (CAC):** The joint FAO-WHO Intergovernmental body that makes legally binding standards for international regulation of food quality, safety and trade. (DM)

**CODOMINANT.** 1. From the phenotypic point of view, status of the alleles of an autosomal gene, where both contribute to the phenotype due to that particular gene in a heterozygote. 2. From the molecular point of view, differences in the two copies of a specific gene in a heterozygous person, that can be visualized by molecular methods (i.e., two sizes of a STR or a VNTR, or presence/absence of a restriction site from a RFLP marker). (GK)

**CODON:** A sequence of three DNA base pairs which codes for an amino acid. Consist of three nucleotides, a three lettered code word (e.g. UUU for phenylalanine/AAA= lysine) for each of 20 amino acids. (DM, JA)

**COEFFICIENT VARIATION:** It is the measure of how much bigger is the standard deviation when compared with the mean (JA)

**COELENTERATES:** Coelenterata is previous taxonomical terminology for the phylum Cnidaria. The coelenterates (cnidarians) include corals, hydrozoans and jellyfish. (See CNIDARIA) (MP)

**COERCION :** An action taken to force another to adopt a behaviour. Issues include force feeding, and mandatory programs as compared to voluntary programs. (DM)

**COGNISANCE:** (Latin: *cognitio* 'apprehend') 1. knowledge, awareness, perception, bioethics self-awareness 2. to investigate for the purpose of knowing, to understand, learn knowledge, recognition by observation or information 3. consciousness, state of awareness [Latin *cognitio* apprehend] (IP)

**COGNITIVE-BEHAVIORAL THERAPY:** was conceived and developed by Aaron Beck, a professor of psychiatry at the University of Pennsylvania, and emphasizes the power of positive thinking. Basically the therapy assumes that, given accurate information, the brain can "think" its way back to health; that is, by harnessing its powerful intelligence, the brain can learn to be objective about itself and replace old destructive thinking patterns with new, constructive adaptive ones. Cognitive-behavioral therapists believe that conscious thought, rather than unconscious motivation, determines social behavior; therefore, with professional guidance, individuals can learn to change their maladaptive

attitudes toward other people. This form of therapy differs from the older psychodynamic therapies by placing greater emphasis upon the active participation of the patient, with the ultimate goal being the regaining of personal control of the social environment through self-education and learned optimism. These therapies have been compared, head-to-head, with antidepressant drugs in the treatment of acute episodes of depression, and found to be effective, especially in milder illness. It seems, therefore, that thinking about how one thinks is an essential tool because it provides a sense of personal control and complements the wise use of medication (see ELECTROCONVULSIVE THERAPY). (IP)

**COGNITIVE LIMITS:** See IMPOSSIBILITY, UNKNOWABLE.

**COHERENCE:** A set of beliefs or theories are in coherence when they are mutually supportive and none are inconsistent with any other. (See CONSILIENCE, CORRELATION) (MP)

**COHORT:** A group of individuals of the same age/generation within a population. It is often useful in ecological management and marine conservation to track cohorts through their life cycle within the general population. (See AGE DISTRIBUTION) (MP)

**COITUS :** (Latin *coire* 'to go together'). An act of intercourse that usually, but not always, involves penetration of the penis into the vagina and results in sexual excitation and, as a rule, orgasm. (See COITUS INTERRUPTUS). (IP)

**COITUS INTERRUPTUS :** Withdrawal of the penis from the vagina just before ejaculation. It is thought to be the oldest method of contraception and is mentioned in the Book of Genesis. The method is not reliable (failure rate is above 15%) because small amounts of sperm containing seminal fluid may be emitted before full sensation leading to ejaculation is felt. Unwanted conceptions may carry the risk of conflict, resentment and prenatal/postnatal neglect. (See NATURAL FAMILY PLANNING METHODS, CONTRACEPTIVES, CONDOM). (IP)

**COLEOPTERA :** The insect order containing the beetles, Coleoptera is such a diverse and widespread order that beetles comprise over a quarter of all species found on Earth today. (MP)

**COLLATERAL DAMAGE:** (Collateral: "situated beside" + Damage: "injury or loss") A military term referring to civilian victims and casualties of military operations, including non-combatant deaths or injuries and damages to civil property. The 1949 Geneva Convention and 1977 Geneva Protocol outline internationally recognized protections for innocent civilians. Scrutinized strategic targeting with modern precision weapons has changed the nature of war in comparison to the deliberate targeting of civilian populations in World War II. Collateral damages are today generally unintentional, and can be used for propaganda purposes and war crimes allegations. The term collateral damage is a good example of the use of euphemism to render distasteful concepts obscure to the layperson. (See GENEVA CONVENTIONS, JUDGE ADVOCATE GENERAL, EUPHEMISM, REFUGEES, CASUALTIES, POST TRAUMATIC STRESS DISORDER) (MP)

**COLLECTIVE:** A group of people who have assembled together due to similar value systems and a common cause; for example a collective farm or kibbutz. (See UNITED) (MP)

**COLLECTIVE BARGAINING:** The practice of reaching work and pay agreements directly through representatives of employers and

employees, often bypassing workers rights protection afforded by industrial dispute institutions such as trade unions. (See INDUSTRIAL RELATIONS, INDUSTRIAL ACTION) (MP)

**COLLECTIVE CONSCIOUSNESS:** A hypothetical spiritual communion of all thoughts, emotions, memes and memories into a collective or super-consciousness, perhaps with emergent properties. (See COLLECTIVE MEMORY, COLLECTIVE UNCONSCIOUS, INFOSPHERE, MORPHIC RESONANCE) (MP)

**COLLECTIVE MEMORY:** The "meme pool", or shared and combined experiences and memories of the sentient animals on Earth. Although each of us has a unique set of memories, we also have shared memories of our historical record and our collective achievements and mistakes. The expansion of this shared consciousness through the promotion of learning can help to guide us towards a more ethical future in which previous human and environmental tragedies are not perpetuated. (See MEME, CULTURE, DREAMTIME) (MP)

**COLLECTIVE SECURITY :** This concept grew out of the Geneva conferences on disarmament after the First World War. Literally the term meant that under the covenant of the League of Nations, the member states of the League should together guarantee the security of each individual member. (See INSTITUTION OF WAR). (IP)

**COLLECTIVE UNCONSCIOUS:** A Jungian psychological theory in which some collective aspects of consciousness such as community history may be imprinted in the individual unconscious mind. (See COLLECTIVE MEMORY, COLLECTIVE CONSCIOUSNESS) (MP)

**COLLECTIVISM:** A socio-political ideology in which means of production and control are placed with the people collectively, usually represented by the state. The emphasis is on responsibilities rather than rights, and the collective is more important than personal individuality. Collectivism may incorporate aspects of family, democracy, socialism and/or Confucianism. (See INDIVIDUALISM) (MP)

**COLONIALISM:** The domination of a country by the imposition of economic, religious, cultural and language practices of the colonial power upon local populations. Examples include the colonization of the African, Asian, Australian and American continents by the English, French, Dutch, Spanish and Portuguese during the 15th to 18th centuries. Most of these colonies have now been granted political autonomy, although usually with the maintenance of cultural and economic ties. Any Western expansionist policies left over from the Ages of Discovery and Imperialism have today been replaced by economic ones. (MP)

**COMA :** Unconscious state, which may occur after a traumatic accident or stroke. Usually after two weeks a person is either dead, or enters persistent vegetative state. (See BRAIN DEATH, PVS). (DM)

**COMMENSALISM:** A symbiotic relationship in which one species gains some benefit from an association with another species, but in which the second partner has neither benefit nor detriment. An example of a commensal organism is the rainforest epiphyte, which grows on the trunk of a host tree and gains the advantage of support, shelter, access to leaf litter, water flow and sunlight. (See SYMBIOSIS, PARASITE). (MP)

**COMMON GOOD:** The good of every body. (See JUSTICE). (DM)

**COMMON LAW** 1. the part of a system of laws of any state or nation that is of a general and universal application 2. the system of laws originated and developed in England, based on court decisions, on the doctrines implicit in those decisions, and on customs and usages, rather

than on codified written laws (see **STATUTE LAW**) (IP)

**COMMON SENSE:** The basic level of practical knowledge and judgment that we all need to help us live in a reasonable and safe way. Common sense varies between people and culture, though it is still called "common". (DM)

**COMMONS:** Land not owned privately but in public ownership. (See **TRAGEDY OF THE COMMONS**) (MR)

**COMMUNICABLE DISEASES :** Diseases that can be transferred between individuals, infectious diseases. (DM)

**COMMUNICATION:** The sending and reception of useful information between two or more parties. (See **DISCOURSE**) (MR)

**COMMUNISM:** The belief in a society without different classes in which the methods of production are owned and controlled by all its members and everyone works as much as they can and receives what they need. It is a system of political and economic organization in which property is owned by the state or community and all citizens share in the common wealth, more or less according to their need. Many small communist communities have existed at one time or another, most of them on a religious basis, generally under the inspiration of a literal interpretation of Scripture. In 1848 the word communism acquired a new meaning when it was used as identical with socialism by Karl MARX and Friederich ENGELS in their famous *Communist Manifesto*. They and their followers used the term to mean a late stage of socialism in which goods would become so abundant that they would be distributed on the basis of need rather than of endeavour. The Bolshevik wing of the Russian Social-Democratic Workers' Party, which took power in Russia in 1917, changed its name to the All-Russian Communist Party in 1918. Thus the Soviet Union and other states that were governed by Soviet-type parties were referred to as "Communist" and their official doctrines were called "Communism," although in none of these countries had a communist society in its original meaning been fully established. (DM)

**COMMUNITARIANISM :** An ethical and political philosophy which combines meritism in the allocation of rights with collectivism in regard to freedom. Central to the communitarian idea of democracy is that citizens' true opinions can only be detected by observing the community's traditional responses to ethical issues; that is, the citizens have to condone traditional values such as, for example, the prohibition of contraceptives on religious grounds. There are two main dividing lines between the most important late twentieth-century theories of ethical and political philosophy. The first distinction concerns the nature of human individualism; that is, freedom or liberalism. The second distinction concerns the nature of human rights or entitlements of help from others in situations where they cannot cope for themselves. These categories can be divided into the ethics of self-actualization and the ethics of caring and are, clearly, interrelated since the second (freedom from need) is a prerequisite to the first (liberty to freely express ones genetic potential). Within these two main dividing lines there are four distinct principles of social and political philosophy; libertarianism, socialism, communitarianism and liberal utilitarianism. All of these four doctrines can be democratic in their own special ways, but the content and principles of democracy varies considerably from one theory to another. (See **LIBERTARIANISM**; **LIBERAL UTILITARIANISM**; **UTILITARIANISM**; **SOCIALISM**; **DEMOCRACY**). (IP)

**COMMUNITY CARE:** government program to provide long-term care for the elderly, disabled and mentally ill within the resources offered by the community, rather than in hospitals or institutions. The policy was first introduced in the UK and Australia in the early 1990s and represented a far-reaching National Health Service reform aimed at replacing traditional institutional provision of long-term care by community outreach programs. It was claimed that the major aim was to offer the long-term patient a better quality of life; however, the



scheme has suffered considerable criticism on the grounds that, as old institutions closed, the level of support for people in need had correspondingly dropped placing a greater burden on non-professional carers, typically the children or partners of the disabled or elderly. (IP)

## **COMMUNITY MANAGEMENT**

**COMMUNITY SERVICES** : Health care and related support services which are based in the local community . (DM)

**COMPASSION**: The emotion associated with sharing the suffering of another together with the desire to give aid. (See BENEFICENCE, CARING, LOVE, VIRTUES) (DM)

**COMPENSATION** : Payment for injury. (DM)

**COMPETENCE** : Mental capacity to make responsible choices. Compare to incompetence, which is used to refer to someone unable to make choices. (See INFORMED CONSENT). (DM)

**COMPETITION**: (Latin: *competere* 'to come together or seek in common') 1. Act of competing in the market, sport, examination etc. 2. In biology a process that determines how available resources are distributed among entities that demand them. The supply of any resource at the scale of biological organisms (including humans), is generally finite. Organisms that are best able to gather a resource amongst the efforts of other organisms to do the same, obtain more of this resource, and are said to be most competitive with respect to that resource. Indirect harm may be caused by the most competitive entity to any less competitive entities who receive less of the resource, especially if the resource is essential to their physical operation. One example of competition concerns plants regenerating in a place cleared of vegetation, but left for plants to regrow. Some plant species are very good at growing quickly, and they gain primary access to sunlight above slower-growing species, reducing the likelihood of their survival if they are unable to cope with reduced light. In this example, only a certain amount of light arrives at the surface of the earth, and this is the finite resource. The plants that are superior at acquiring light (by growing taller), do so at the expense of plants who are less competitive (slower growing). A related, and ethically relevant example is competition for space and other resources between humans and species of plants and animals. Humans are able to acquire vast areas of space (by habitat modification) at the expense of the organisms that occupied this space previously (unable to exist in the modified environment). Interestingly, some organisms might be better able to occupy the modified habitat, and they profit (e.g. establish larger populations) compared to their ability in the unmodified habitat. What, if anything, determines how much a particular organism should harm a competitor by reducing the amount they receive of an essential resource? Large bodies of empirical and theoretical research into aspects of competition exist in the ecological and economic literature. (See TRAGEDY OF THE COMMONS). (IP+HM)

**COMPLACENCY** : See APATHY.

**COMPLEMENTARY DNA (cDNA)**: DNA that is synthesized from a messenger RNA template; the single-strand form is often used as a probe in physical mapping. (DM)

**COMPLEMENTARY MEDICINE**: is a vast, heterogeneous set of therapies which generally have a common philosophy which is a belief in a holistic approach to health. Therapies focus, to varying degrees, on the integration of mind, body and spirit to restore health. Complementary medicine is also known as complementary and alternative medicine (CAM), natural therapies, alternative medicine, unconventional medicine and integrative medicine. Terms including "alternative" are now considered to be inappropriate as they imply a polarized position to that of

allopathic or conventional medicine and is sometimes used in a pejorative sense to imply some form of quackery. A general definition is that complementary therapies are those therapies that are not taught as a normal part of medical education or provided within conventional health care facilities. However this becoming an increasingly impractical definition due to increased integration of complementary and conventional health care. In addition there is a culture context where therapies considered complementary in one culture may be mainstream in another e.g. acupuncture in China (JW).

**COMPLEX:** 1. Unpredictable, intricate, complicated or composed of many parts. (See COMPLEXITY) 2. Psychology: A group of related feelings, emotions or ideas which are activated, expressed, repressed and selected for together. (See MEME COMPLEX) (MP)

**COMPLEXITY:** Lack of predictability in a system due to nonlinear collective behavior. General order of complexity in the sciences, from the simplest or most predictable system mathematics, whose statements are logical consequences or tautologies, then increases through physics, chemistry, microbiology and biology, to greatest complexity in ecology and human sociology. A crude measure of complexity is the amount of information or symbols required for description. The emerging science of complexity theory tries to elucidate the universal features of complexity among systems. It uses synthesis as an opposing complement to reductionism, at the level of the behavior of subsystems and whole systems. (See COMPLEX, COMPLEXITY THEORY, SYSTEMS THEORY, EMERGENT PROPERTIES, SIMPLICITY, SIMPLEXITY, COMPLICITY, COMPLICATEDNESS, CHAOS) (MP)

**COMPLEXITY THEORY:** ‘Complexity theory’ is the investigation of ‘nested’ hierarchies of subsystems, leading to coordinated behavior and ‘emergent properties’ in meta-systems. C, chaos and order. Some of these trains of thought have a philosophical lineage in ‘rational morphology’ and the search for ‘laws of form’ (e.g. Kant, Kauffman, ARCHY, NETWORK, PROCESS) (MP)

**COMPLICATEDNESS:** Difficulty of analysis and understanding due to the presence of many interconnected elements. (See COMPLEXITY) (MP)

**COMPLICITY:** 1. Complicity is being in partnership; having an accomplice and sharing responsibility. 2. Complexity theorists Jack Cohen and Ian Stewart use complicity to mean the ‘emergence’ of large-scale simplicity from the convergence of different subsystems of rules, which ‘enlarges the space of the possible’. Examples include evolution, consciousness, economics. Complicity is also referred to as ‘super emergence’ (‘regular emergence’ is expressed in ‘simplicity’). (See SIMPLICITY, SIMPLEXITY, COMPLEXITY, EMERGENT PROPERTIES) (MP)

**COMPONENTS:** Units, parts, parameter, factors of a system, independent and interdependent units. Biotic components: genes, cells, organs, organisms, populations, communities. Abiotic components: Matter and energy (JA)

**COMPROMISE:** 1. Compromise is the process or result of concessions from both sides of a dispute with the aim of finding common middle ground. Settlement of differences is achieved from mutual adjustment of conflicting claims/principles by yielding a part of each. Compromise is possible for disputes but may be more difficult for institutionalized conflict. Cultural values or human needs such as identity and security may not be subject to compromise. 2. A concession made at the expense of one’s integrity or original values; exposure to danger or suspicion, especially of reputation to subject it to risk of passage to an unauthorized person. ‘Compromise’ is from the original Latin: *compromissum* ‘mutual

promise to abide by a decision', now obsolete but appropriate to biohe previous positions. (See CONSENSUS, CONCILIATION, COLLABORATION, CONDITIONALITY, NEGOTIATION, FACILITATION, ARBITRATION, DISPUTE, CONFLICT) (IP & MP)

**COMPREHENSION** : Understanding by a patient or research subject of information disclosed orally or in writing. (DM)

**COMPUTER** : Any automated device or machine that can perform calculations on information or data. The data must be received in an appropriate form that is then processed according to specific instructions. The most widely used is the digital computer - an automatically controlled calculator machine in which data is represented by combinations of discrete electrical pulses. The information is analyzed according to a set of instructions or programs. At the same time as the computer's electronic circuits have decreased in size they have become smaller, faster and much more powerful. Fields such as science, technology, industry, commerce, education and communication could not cope in the modern world without the use of modern computers. (See COMPUTER MODELING). (IP)

**COMPUTER MODELING** : The development of a description or mathematical representation; i.e. a model, of a process or living system using a computer. This model can then be used to study the mechanism or behavior of the system under varying artificially controlled conditions, and analyzing likely outcomes. For example, the likely effect of a climatic change in areas where certain types of fauna and flora flourish maybe be amenable to modeling. To explore variables to an extent that is not possible by any other experimental means makes computer modeling a powerful tool in predicting possible ecological reactions under modern environmental stresses. (See COMPUTER). (IP)

**COMPUTER VIRUS** : An unauthorized computer program or software fragment which has the ability to propagate itself within a networked computer system or across the internet. It parasitizes other software, often damaging, deleting or otherwise interfering with data and/or the normal operations of programs. A 'virus' propagates itself by latching onto another program or data file. A 'worm' is able to self-propagate copies or segments of its programming autonomously. A 'Trojan horse' masquerades as a useful program whilst covertly accessing or altering restricted information. Computer viruses may be programmed by hackers, targeted at specific organizations by hacktivists, indiscriminately released by hacks, or strategically employed to jam data and communications during cyber-warfare. Viruses may arrive as executable e-mail attachments, and are often targeted at Microsoft products because of the widespread use of this software. Reproduction can be rapid and global, for example using e-mail address lists for propagation. This necessitates constant engineering of antivirus software, an interesting example of which is the 'viral predator' sent down the same electronic pathways in an attempt to hunt down and neutralize the virus and its progeny. (See WORM, BUG, VIRUS, ARTIFICIAL LIFE, HACKERS, HACKTIVISM) (MP)

**COMPUTER WORM** : See WORM.

**CONCENTRATION CAMP** : Internment centers for political prisoners. The British were the first to have instituted a system of concentration camps in Cap Colony and the Transvaal during the Boar War of 1901-1902. However, the most notorious concentration camp system was that used in Nazi Germany during the Second World War. Among the most infamous were Belsen, Buchenwald, Dachau, Auschwitz, Oranienburg, Papenburg, Maidanec and Treblinka. On account of their ethnicity, millions of innocent people were starved, tortured and killed in these camps as a deliberate act of mass extermination. (See INSTITUTION OF WAR, NAZI(S)). (IP)

**CONCEPTION**: The fertilization of the egg by a sperm that initiates the formation of a zygote (has been used for implantation also). (See FERTILIZATION) (DM)

**CONCEPTUS:** This term refers to the products of fertilization. It includes the embryo proper as well as extraembryonic structures and tissues that develop from the zygote (e.g. placenta). It is also called the *preembryo* . (DM)

**CONCILIATION:** Dispute resolution in normal relationships by the offer of friendly gestures and overtures. (See CONFLICT RESOLUTION) (MP)

**CONCUBINE:** archaic term for a class of woman who co-habits in the same house without being married to her partner. The famous orator of Greece Demosthenes (384-322 BC) placed things of Eros in perspective by defining " *We have hetairas (prostitutes) for sensual pleasure, concubines for our daily bodily needs, and legal spouses to give birth to pure children and to be faithful guardians of the home .*" In the majority of nations the legal rights of the de-facto partner or modern concubine approaches that of marriage (see marriage). (See MARRIAGE, OPEN MARRIAGE, ADULTERY) (IP)

**CONDITIONALITY:** 1. Depending upon certain conditions for a particular outcome. 2. A term pertinent to discussions of international development, often referring to the conditionality imposed upon 'structural adjustment' loans issued by instor elementary school education in developing countries. (MP)

**CONDOM:** is a barrier method of contraception and protection from sexually-transmitted diseases (STDs) including AIDS. The term is derived from the Latin *condus* meaning receptacle and was originally designed as a prophylactic against STDs associated with prostitution. When properly used it ranks relatively high in effectiveness; however, its failure rate of between 10 and 15 percent, among the young especially, is often high (see FEMALE CONDOM). (IP)

**CONFIDENCE LIMITS :** Numbers that indicate the statistical certainty of a particular value. For example, if the 95% confidence limits for the mean mass (3.2 g) of a particular species of snail in a named wood are  $\pm 0.13$  g it means that there is a 5% chance that the mean mass of that species of snail in that wood lies outside the range 3.07 to 3.33 g. (MR)

**CONFIDENTIALITY:** One of the important components of bioethical principles and a fundamental component in the physician-patient relationship, stemming primarily from the Hippocratic oath. All information of a person, whether personal, private or genetic is confidential and not to be revealed to others without the individual's consent. In the case of AIDS patients their visit to the testing place and results of testing should be held in confidence (DM, JA).

**CONFLICT:** A situation in which opposing viewpoints have come into physical confrontation. Conflicts are more intractable than simple disputes because of the existence of institutionalized, fundamental disagreement with limited malleability of participants or the situation. (See DISPUTE, CONFLICT RESOLUTION) (MP)

**CONFLICT OF INTEREST** : Can arrive any time personal, family, national or financial interests distort the pure pursuit of truth, goodness, love or health. This can apply to anyone, for example a cab driver who takes you for a longer ride than necessary, or a member of the family of a terminally-ill mentally incompetent patient, who makes a "proxy" or "surrogate" decision to stop treatment, ostensibly for the patient's good but really to benefit from an inheritance, or because of the high cost of medical treatment (in those countries which do not yet have universal, government-supported, free health care), or because of the simple burden of care.

Bioethical attention, however, is usually given to conflicts of interest of scientists, scholars and health professionals. Cases are clear when a physician prescribes drugs manufactured by a company from which the physician benefits financially, or when a scientist publishes an article with positive conclusions about a drug or other product of a corporation for which the scientist works. Things are more complicated when a nurse hesitates to complain about medical negligence for fear of jeopardizing employment or advancement, or when a physician eats a free lunch supplied by a drug company for all who attend a staff lecture or grand rounds.

It is hard to be totally pure and free of conflict of interest. You may refuse to fly to a conference if the tickets are supplied by a corporation which you would like to be free to criticize, only to discover later that the disinterested scientific association which invited you received donations from that same corporation. And if you pay for the tickets from research funds which you receive from your own university, you might want to look into the corporations whose donations are allowing your university (and you and your family!) to survive. Nor does it help to say that everything is alright if you have academic freedom to say what you want. During the United States war in Vietnam, universities which existed on weapons research contracts were happy to employ radical anti-war professors, whose noisy presence gave the university a liberal image. Even if one could get free of financial interests, personal and emotional interests would remain. There is a school of literary criticism called "deconstructionism" which seeks the hidden motives of authors of literary creations. Ideas from this school have had some influence on philosophical and scientific criticism. Medical journals are beginning to require that authors list possible conflicts of interest. (FL)

**CONFLICT RESOLUTION:** Conflict resolution is an important feature of both personal and international relations. Conflict analysis, negotiation, mediation, conciliation, facilitation, arbitration and judicial settlement are aspects of collaboration towards a compromise or consensus decision. Negotiation can be aided by good working relationships, persuasive value systems and 'soft power'. Mediation provt, whereasTION, COMPROMISE, CONSENSUS, CONCILIATION, PREVENTIVE DIPLOMACY, PEACE BUILDING, PEACE MAKING, PEACE KEEPING) (MP)

**CONFUCIUS:** Confucius (c.551-479 bce) Philosopher of ancient China. The teachings of Confucius were recorded by his students, especially in the book known as Lun Yu (or in English: Analects). Confucius stressed the importance of acquiring virtue and acting according to proper moral behavior. His teaching places special emphasis on the importance of family, and on filial obligations towards parents. The father-son relationships is one of the Five Relationships (see Five Relationships). Confucius' teachings were influential not only in China, but also in Japan, Korea, Vietnam and other parts of East Asia. (AG)

**CONFUCIAN CANON:** Chinese texts of Confucianism containing the philosophy of Confucius, or K'ung Fu-tzu (551-479 BCE ), originally comprising the Five Classics ("Shih Ching", "Li Ching", "Shu Ching", "Chun Chiu" and "I Ching"), later reorganised by Chu Hsi (1130-1200 CE ) into four Books ("Analects of Confucius", "Book of Mencius", "Great Learning" and "Doctrine of the Mean"). (See CONFUCIUS) (MP)

**CONGENITAL DISORDER** : A defect present at birth, regardless of cause, which may or may not be inherited. (JA, DM)

**CONGENITAL MALFORMATION** structural or anatomical aberrations or less obvious physiological, functional, immunological or behavioral defects in neonatal or postnatal offspring (see teratogen). (DM+DR)

**CONIFEROUS FOREST:** The coniferous, or 'boreal' forest, or 'taiga', coniferous forests provide important habitat for hawk, owl, mink, elk, moose, bears and wolf. (See TAIGA, GYMNOSPERM, SOFTWOOD) (MP)

**CONJECTURE:** Conjecture simply means taking a guess. For example, a hypothesis is a refined and structured kind of conjecture. An educated guess is made by an expert with some backing in related knowledge. Heuristics is the use of educated guesses in the search for a solution. (See HYPOTHESIS, HEURISTICS, ASSUMPTION) (MP)

**CONJOINT TWINS:** Two fetuses developed from the same ovum that are physically united at birth. Conjoint twins are the result of identical twins where the split is incomplete and the two new embryonic axes fail to separate in their entirety. The degree of union may be slight or extensive, and the twins may be joined at any part of their bodies. Most conjoined twins do not survive after birth and frequently suffer from major heart malformations. Ever since medical science made the separation of conjoined twins a possibility, there have been concerns about the ethics involved; sometimes one of the twins is sacrificed for the sake of the other. The famous 'Siamese' twins, Eng and Chang Bunker, were born in 1811, lived for 63 years and had 22 children between them. Their wives lived in separate houses and the twins spent alternate weeks with each of them. (See TWINS/TWINNING). (IP)

**CONJUGATION:** The reproductive process by which DNA is transferred between bacteria during cell-to-cell contact. (DM)

**CONSANGUINITY:** Descent from common ancestors. (DM)

**CONSCIENCE:** The ethical sense of right and wrong which is generally valued as the hallmark of a true existence as it represents the ability to choose and decide to take action and assess reaction. What one believes is right or wrong. It is sometimes thought of as an "inner voice". The conscience is a very unreliable guide to ethics. Psychopathic killers have sometimes thought that their consciences were telling them to kill. (IP, FL)

**CONSCIENTIOUS OBJECTOR** : A term that came into prominence during the First World War and applies to those who object to military service in a fighting capacity on moral, religious or ethical grounds. The British Military Service Act of 1916 dealt with conscientious objectors characteristically harshly. In 1939 provisions were made in the Military Training Act for exemption of *bona fides* to be allocated to various other appropriate form of national service. (See VIETNAM WAR, INSTITUTION OF WAR). (IP)

**CONSCIOUSNESS:** The registration of an effect, for example, a scale is conscious of weight. The ability to be aware of one's actions or experiences. Most biologists would hold that at least many mammals species, including the non-human primates, exhibit consciousness. Moral agents have especial duties towards conscious entities since such entities are aware of their pleasures and PAINS (q.v.). It is difficult to suppose that there will never be conscious ROBOTS (q.v.). (MR)

**CONSEQUENT** : In logic the second part of a conditional statement; that is, a statement (or proposition) that is said to follow from, or be implied by, another statement. For example, if the breeding conditions improve then the endangered species will flourish - will flourish is the consequent. (See CONSEQUENTIALISM). (IP)

**CONSEQUENTIALISM:** The normative theory that the rightness or wrongness of actions is determined by anticipated or known consequences, compare to deontology. (DM)

**CONSENSUS:** A consensual agreement or win-win outcome of collaborative problem-solving and conflict resolution. A consensus implies that debate has taken place, the solution is generally accepted rather than a grudging compromise, and that agreement is deep-rooted enough that it can stand for some time without need to revisit the issue. (See COMPROMISE, COLLABORATION, CONFLICT RESOLUTION, DELPHI METHOD) (MP)

**CONSENSUS CONFERENCE :** A conference of persons, usually of lay persons, which seeks to reach consensus on a moral dilemma, which is useful as a model for society. (DM)

**CONSENT:** See INFORMED CONSENT.

**CONSENT FORMS :** Papers given to persons to explain a procedure, and request their signature as a record of agreement. (See INFORMED CONSENT, CLINICAL TRIALS). (DM)

**CONSERVATION:** includes both preservation and protection, preservation for long term use by the future generation and protection of what we have on the biosphere (earth). Opposite of hoarding. Needs sound management practices. Two types - In situ and Ex situ depending on the region of conservation. see In situ and Ex situ. **In situ Conservation:** - conservation of naturally found ecosystems includes the care and maintenance of living populations of species in their natural habitats - domesticated and cultivated species. **Ex situ Conservation:** - When an exotic species is removed from its original habitat and in an artificial habitat such as the zoo/zoological parks and botanical gardens/seed banks. Currently there are about 500.000 species of living creatures in zoos and 35,000 species of plants in 1,500 botanical gardens which is 15 per cent of world's plant resources. Some estimates indicate the number of plant species in botanical gardens as high as 70,000 to 80,000 species. Example - Royal Botanic Gardens at Kew, UK (JA)

**CONSERVATION DEPENDENT SPECIES:** A species which is the focus of a continuing program of taxon or habitat conservation, such that it would qualify for threatened species status if the conservation efforts were to cease. (See CONSERVATION, THREATENED SPECIES, ENDANGERED SPECIES) (MP)

**CONSERVATION OF BIODIVERSITY:** See CONVENTION OF BIOLOGICAL DIVERSITY.

**CONSERVATION OF CULTURE:** See CULTURAL HERITAGE, CULTURAL EVOLUTION.

**CONSERVATION OF HERITAGE:** See HERITAGE.

**CONSERVATION MOVEMENT :** Widespread belief, accompanied by action, that wildlife and wilderness areas should be preserved. Many traditional cultures have an implicit conservation movement, though traditional cultures have also often caused environmental degradation and have resulted in species going extinct. In the West the modern conservation movement dates only from the late nineteenth and early twentieth century when increasing numbers of people became concerned at the threat to rare species, scarce habitats and unspoilt areas of natural beauty. An increasing number of non-government organisations have arisen dedicated to conserving certain aspects of the natural world. (See GREEN MOVEMENT). (MR)



**CONSILIENCE** : The joining together of knowledge and information across disciplines to create a unified framework of understanding. The concept was developed by Harvard biologist E.O. Wilson in a book named *Consilience: the unity of knowledge* (1997). (See E.O. WILSON, HOLISTIC THINKING) (RW)

**CONSPICUOUS CONSUMPTION**: The consumption of goods based on the desire for social status, such that the satisfaction is based upon the desire to impress rather than on any other usefulness or utility of the item to the consumer. (See CONSUMPTION, CHINDOGU) (MP)

**CONSTANT CAPITAL**: The ‘constant capital’ rule implies the passing on to future generations of an aggregate capital (economic, human and natural capital) equivalent to that of today. ‘Strong sustainability’ requires the forms of capital to remain in constant proportion, whereas ‘weak sustainability’ allows substitution between them. ‘Critical natural capital’ *must* remain constant, functioning as it does to provide our global life-support system. (See STRONG SUSTAINABILITY, WEAK SUSTAINABILITY, NATURAL CAPITAL, CRITICAL NATURAL CAPITAL) (MP)

**CONSTRUCTIVE CRITICISM**: See SCIENTIFIC METHOD.

**CONSUMER PARTICIPATION** : See PUBLIC PARTICIPATION.

**CONSUMPTION**: Resource consumption is the utilization of natural capital, involving flows of energy and materials from the environment. Consumption creates the demand which is the economic driving force for production and supply. Personal consumption may be measured per capita in dollars, energy use, tonnes of CO2 emissions, paper consumption, water usage, or ecological footprint. Consumption is one of the major socioeconomic factors leading to environmental destruction. It is a central component of Ehrlich’s famous equation  $I=PCT$  (in which  $I$  = ecological impact,  $P$  = population,  $C$  = consumption, and  $T$  = thesis on materialistic economic measures of wellbeing. Reality however reminds us that global limitforms of consumption have environmental costs significantly disproportional to any real human benefcuous consumption are phased out or become socially unacceptable. (See ECONOMY, CONSPICUOUS CONSUMPTION, SUSTAINABLE DEVELOPMENT, SUFFICIENCY) (MP)

**CONTACT TRACING** : A public health practice of identifying persons who have been exposed to a communicable disease through person-to-person contact; includes, for example, identification of the sexual partners of persons infected with the human immunodeficiency virus. (See AIDS, CONFIDENTIALITY , COMMUNICABLE DISEASES, PUBLIC HEALTH). (DM)

**CONTAINMENT** : The use of biological or physical means to minimize or prevent the dissemination of biologically active agents which may be hazardous. (See BIOSAFETY, RECOMBINANT DNA RESEARCH). (DM)

**CONTENTS**: 1. Important initial reference list of the structure, organization and themes within a work of (usually) non-fiction. (See INDEX)  
2. Inside elements; ingredients determined by the reductionist approach of breaking something down into its constituent parts. (See CONTEXT) (MP)

**CONTEXT**: Outside elements; external environment and conditions, investigated using the Systems Theory approach of checking for interactions and influences to/from higher scales and surrounding systems. (See CONTENTS) (MP)

**CONTIGS:** Groups of clones representing overlapping, or contiguous, regions of a genome. (DM)

**CONTINUUM:** A plane of thought; a continuous axis or tangent. In mathematics the continuum is the set of all real numbers. Elements or opinions are arranged in clumps along many conceptual continuums. Opposites are at polar extremes of a continuum, but often cannot really exist without the other. The continuum reminds us that ideas have fuzzy boundaries, and that most things are not black-and-white but a matter of degree. (See SPACE-TIME CONTINUUM, FUZZY LOGIC, MIDDLE WAY) (MP)

**CONTRACEPTION:** the prevention of pregnancy, especially through the use of devices and medications, or through behavioral procedures such as withdrawal, abstinence, and sterilization. Contraception by biological means involves the prevention of one or more of a) formation or release of gametes in the male or the female b) fertilization c) implantation of the fertilized egg, or development of the early embryo [Latin *contra* + *concupere* to take in] (see Contraceptives). (IP)

**CONTRACEPTIVES:** devices or medications used to prevent conception. These include diaphragms, condoms, intrauterine devices (IUDs), cervical caps, spermicidal creams, various formulations of the pill, subdermal implants and injectables (see Contraception). (IP)

**CONTRACT:** Binding agreement between two or more parties. Most ethicists would hold that a person generally has a duty to fulfil a contract into which she has voluntarily entered unless certain unforeseen and particular circumstances arise so that significant harm would result from fulfilling the contract.

A social contract, is, roughly speaking, a presumed, implicit agreement between the members of a **SOCIETY** (q.v.) or between individuals and the state. Thus, for example, there may exist an unspoken agreement that the state should uphold the rule of law so that I and other good citizens may live in peace but that, at the same time, I have certain duties towards the state - for example, to sit on a jury or even fight on its behalf in a (just) **WAR** (q.v.). (MR)

**CONTRACTARIANISM:** Ethical and political theories involving a social contract. Negotiations are capable of yielding mutual principles of conduct, which are binding upon all parties to create a just society. Ethical philosophers who had an influence on contractarian thought include Hobbes' moral theory based on desire, and Kant's "Metaphysics of Morals" (1797). The most famous contemporary contractarian is John Rawls, who in his "A Theory of individual equality. Other contractarians may define the goals or contracting parties in different ways, the most good for the greatest number. (MP & IP)

**CONTROL GROUPS :** Groups that serve as a check or standard of comparison in experimental studies . (DM)

**CONVENTION OF BIOLOGICAL DIVERSITY (CBD)** It was negotiated before the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992. The agreed text of the convention of biological diversity was adopted by 101 governments and signed by 159 governments and the European Union. It was adopted to stress the equity in the use of biodiversity on ethical principles. CBD has been ratified by a total of 177 countries, excluding the United States of America. The objectives of the Convention as stated, in part, are as follows: Article 1 "conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies". Article 2 " *Biological Diversity* means the variability among living organisms from all sources, including, inter alia, terrestrial,

marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems". (IP, JA)

**CONVENTIONAL WEAPONS:** Euphemistic term for missiles, explosives, artillery, small arms and other weapons, which although distinct from nuclear or other 'weapons of mass destruction', have in total produced ovance, Russia, China and North Korea who have been among major world-wide distributors of conventional weapons. The boundaries of 'conventional' should not be pushed to include decidedly unconventional new proposals such as space weapons, low-impact nuclear weapons (e.g. gamma ray bomb) or 'swarm intelligence'. (See SMALL ARMS, EXPLOSIVES, MISSILES, LAND MINES, NON LETHAL WEAPONS, DISARMAMENT) (MP)

**CONVULSIVE THERAPY:** See ELECTROCONVULSIVE THERAPY

**COOPERATION** a mutually helpful interaction essential in all living communities which when not embraced in human communities typically results in conflict and destructive competition for resources. (See **TEAMWORK, CONSENSUS, COMPROMISE, BRAINSTORMING**). (IP)

**COPYRIGHT:** Copyright protection applies to eight categories of works: literary; musical; dramatic; pantomime and choreographic; pictorial, graphic and sculptural; motion pictures and audio-visual work; sound recording; and computer programs. Copyright protects the expression of an idea, not the idea itself. (DM)

**CORAL:** Coral is a colonial animal which is formed from the symbiotic relationship of single-celled dinoflagellate algae (zooxanthellae) with coral polyps (class Anthozoa, phylum Cnidaria). The polyps exchange phosphates and nitrates for carbohydrates in the process of skeleton building. (See CNIDARIA, CORAL REEF, CORAL BLEACHING) (MP)

**CORAL BLEACHING:** A devastating condition which has spread alarmingly in recent years and now affects large regions of Earth's coral reef systems, coral bleaching occurs when the zooxanthellae evacuate the coral skeleton, leaving thting global warming as a possible cause. Coral bleaching is a process which destroys the very habitat upon which whole ecologies depend. (See CORAL) (MP)

**CORAL REEF:** A habitat which provides for one of the largest biodiversities of any other, coral reefs are perhaps the underwater equivalent of tropical rainforests. Also found mostly in tropical and subtropical zones, coral reefs tend to form in less than 100m depth and greater than 18 ° C temperature. An atoll is a coral island, often a ring of reef with a lagoon. Coral reefs are dynamic systems with high biodiversity, productivity and complexity, even in a nutrient-poor environment. They are giant living platforms of interlaced corals and the complex ecological community that comes along with them. Coral reefs are fragile, and currently threatened by coral bleaching, sediment/fertilizer runoff, commercial fishing trawlers, over-fishing, oil exploration, pest species like the crown-of-thorns starfish, anchor damage, development and mass tourism. (See CORAL, CORAL BLEACHING, GREAT BARRIER REEF, SUPER-ORGANISM) (MP)

**CORNUCOPIANS** are individuals who believe human population control is not needed. Originated from *cornu copiae* or horn of plenty (after the goat Amalthea by which Zeus was suckled). (IP)

**CORONAS** meaning "crown" are colored rings which appear around the moon or sun when seen through thin clouds consisting of water

droplets. They are produced by diffraction and are more common with the moon because the sun's brightness may make it difficult to see the effect (see RAINBOWS, HALOES, MIRAGES & GREEN FLASH). (IP)

**CORRELATION:** Relationship between two variables. A correlation coefficient shows how closely two sets of data are related. If the relationship between the two sets of data is perfect and positive, then the correlation coefficient is 1.0. If, for example, an extra 1 cm of height always meant that a person was 600 g heavier, then the correlation coefficient between heights and masses among people would be 1.0. If the relationship between two sets of data is inverse, then the correlation coefficient is negative. A perfect, inverse relationship has a correlation coefficient of -1.0. When there is no relationship between two sets of data the correlation coefficient is close to 0 and does not differ significantly from it. Correlation does not imply CAUSATION (q.v.). (MR) (See CAUSATION)

**CORROBORATE:** A hypothesis is corroborated if it is subjected to an experimental test which cannot manage to falsify it. (See FALSIFICATION) (MP)

**CORROBOREE** It is said that the word is the English version of the Australian Aboriginal term "carib-berie" or ceremony ritualized in song and dance. Traditionally, corroborrees re-enacted the Dreamtime or Creation stories and were also activated for sacred, law education or war-like purposes. Aboriginal cultures have an oral tradition where stories (often passed from one generation to the next for thousands of years) are used to educate about traditional law, folk lore, spirituality and gender-specific matters (see Men's Business & Women's Business). Nowadays their perspective (see AUSTRALIAN ABORIGINAL). 2. In general usage for any large and noisy Australian celebration. (IP)

**CORTISOL:** A glucocorticoid steroid hormone produced naturally by the cortex of the adrenal gland and also synthesized for pharmacological use. Cortisol and its synthetic derivatives; such as cortisone (also called prednisolone), are most potent anti-inflammatory agents that can effectively treat asthma attacks and reduce joint inflammation. When injected directly into joints, bursae or tendon sheaths the drug, since it does not enter the general circulation, is less likely to cause multiple toxic effects compared to oral administration. Treatments for asthma, which are typically delivered in aerosols (puffers or inhalers) containing corticosteroids such as cortisone, are drugs that relax (bronchodilate) airways. Asthma is more common in Australia and New Zealand than anywhere else in the world. It is thought to be provoked by external allergens such as pollen, dust, certain foods, emotional crises and excessive cold or exercise. (See ADRENAL GLANDS; ASPIRIN). (IP)

**COSMETIC SURGERY :** (Greek *kosmesis* 'adornment'). The improvement of the outward appearance of parts of the body. A distinction can be made between cosmetic surgery and plastic surgery where the former, typically, refers to minor reconstruction of cutaneous or underlying tissues performed to improve or correct a structural defect. This is usually done under local anesthetic. Plastic (from the Greek *plassein* 'to mold') surgery, on the other hand, applies to the alteration, replacement or restoration of visible parts of the body in order to correct a major structural or cosmetic defect. In these operations the surgeon may, typically, resort to tissue grafting (most commonly skin grafts) or employ inert material that can be molded into the required shape (mammoplasty or breast implants, for example). Reconstructive plastic surgery is routinely performed to correct birth defects (cleft lip and palate, for example) and to repair structures destroyed by trauma. (See COSMETICS). (DM, IP)

**COSMETICS** : (Greek *kosmein* 'to adorn'). The preparations used to enhance the appearance of skin or for emphasizing the features of the face or the shape of the finger-tips and so on. Face powder made of powdered rice or semolina, or of chemical compounds has been widely used for giving the face a smooth, mat surface. Kohl is used for shading the eyelids in order to make the eyes appear bigger, henna for staining hair, fingers and toes. Rouge for coloring cheeks and rouge paste (lipstick) for reddening the lips and varnish for finger and toenails. Since antiquity, the human animal has re-designed the body to enhance beauty for aesthetic augmentation and for heightened sexual excitement. (See COSMETIC SURGERY). (IP)

**COSMIC RADIATION** : High-energy particles with extreme penetration power capable of passing through many meters of lead. Cosmic rays originate in outer space and are distinguished as primary which impinge on the Earth's atmosphere and secondary which are produced within the atmosphere, or the Earth itself, from collisions between the primary radiation and atmospheric atoms. (See RADIOACTIVITY, RADIATION). (IP)

**COSMOGONY**: Pre-scientific, mythological, folkloric and religious explanations of the nature and genesis of the universe. (See COSMOLOGY) (MP)

**COSMOLOGY**: The scientific and philosophical study of the cosmos; the observable universe and the universe as a whole. (See ASTRONOMY, ASTROPHYSICS, COSMOGONY) (MP)

**COST-BENEFIT ANALYSIS**: (See DECISION SUPPORT SYSTEMS)

**COUNSELLING** : Provision of help, support of every kind (e.g. Moral, mental, spiritual) to a person in need e.g. Disease stricken. (See also GENETIC COUNSELING). (JA)

**COURTESAN**: 1. (Italian: *cortigiana* 'woman of the court') a court mistress or woman who provided companionship and/or sexual services for a member of the wealthy aristocracy, usually on a long-term basis, in return for financial support and a place to live 2. generally a 'high-class' prostitute (see MISTRESS). (IP)

**COVENANT**: A solemn agreement between two or more parties. A binding, enduring relationship characterized by mutual fidelity and trust. (DM)

**CPR**: Cardio-Pulmonary Resuscitation.

**CPU** : See CENTRAL PROCESSING UNIT.

**CRACK OR CRACK COCAINE**: The street names of a highly addictive form of cocaine which is smoked. It's made by baking a mixture of crystalline cocaine with baking powder and wafrom the distinctive 'cracking" sound the hard substance makes when broken crack pipe (the home-made device in which crack is smoked) and crack wars (ack babies) commonly with brain damage and other developmental disorders (see COCAINE HYDROCHLORIDE; COCAINE BABIES; ADDICTION). (IP)

**CREATION**: see CREATIONISM; ORIGIN OF LIFE.

**CREATIONISM**: The idea that God created the world, sometimes also identified with the idea that God created each species separately.

Some people think that creationism conflicts with the idea that the world has always existed, but there is no contradiction in the idea that a God who has always existed has always been creating the world. Some people think that Darwinist evolutionary theory conflicts with creationism, but there is no contradiction in the idea that God created the world with laws of the sort described in Darwinist evolutionary theory. (See ORIGIN OF LIFE).

Fundamental Christian creationists have often objected to Darwin, just as the Catholic Church condemned Galileo for his acceptance of the Copernican heliocentric theory in astronomy. This was because Christians often insisted on a literal interpretation Of the Bible. But Jews, who since Talmudic times have been accustomed to metaphorical interpretations of Biblical texts, had no theological problems either with Galileo or Darwin. Darwin reported that an article in Hebrew claimed that the doctrine of The Origin of Species matches the Biblical account of creation. Rabbi Avraham Itzhak Kook, the great rabbi and philosopher of modern Israel, had a philosophy very congenial to Darwinism. (See ORIGIN OF LIFE) (FL)

**CREATIVITY:** Valid originality. (MR)

**CREEL SURVEY:** A creel is a basket or trap for holding fish, so a creel survey is a technique for estimating fishing effort by interviewing fishers and surveying their catch. (See SUSTAINABLE FISHING) (MP)

**CREMATION:** Burning of the human body and reducing it to ashes. This practice was in effect in Europe already in the Stone Age. In Mycenaean Greece (10 century bce), it was an important part of Greek funeral ceremonies. Cremation was widely practiced in the Roman Empire, but was avoided by the Jewish and Christian communities, because the practice was seen as pagan. It was also avoided by Zoroastrians because it was seen as polluting the fire. (see Tower of Silence) In Asia, cremation is an important part of Hindu and Buddhist funerals, and has been practiced since ancient times. (AG)

**CREUTZFELDT-JAKOB DISEASE (CJD)** a fatal encephalopathy caused by a prion first documented by German neurologists Hans Creutzfeldt (1885-1964) and Alfons Jakob (1884-1931). The formation of dementia-inducing plaques in the brain of infected individuals causes a progressive decline in cognition and motor function and, ultimately, death within a year of commencement of symptoms. The prion is thought to be a human variant of mad cow disease. There are well documented cases of cross-infection in patients who have developed the disease iatrogenically following corneal transplantation or hormonal treatments, such as fertility drugs or growth hormone, processed from infected human pituitary-derived preparations. The true extent of spread in the human population is unknown because of the disease's extended 15-40 year incubation period (see PRIONS & BOVINE SPONGIFORM ENCEPHALOPATHY). (IP)

**CRIMES AGAINST HUMANITY:** A term used since the Nuremberg Trials, international war crimes recognized as 'Crimes Against Humanity' (Rome Statute of the International Criminal Court, 1998) are known acts as part of widespread or systematic aggression towards any civilian population which include: a) murder, b) extermination, c) enslavement, d) deportation or forcible transfer, e) imprisonment, f) torture, g) rape or enforced prostitution, pregnancy or sterilization, h) group persecution on grounds of politics, race, nationality, ethnicity, culture, religion or gender, i) enforced disappearance, j) the crime of apartheid, and k) other similarly inhumane acts causing great suffering or serious mental or physical injury. (See WAR CRIMES, GENOCIDE, JUST WAR THEORY, NUREMBERG TRIALS, INTERNATIONAL CRIMINAL COURT) (MP)

**CRIMINAL JUSTICE** .Leads to the wider issue of social justice - the idea of equality at the starting line like equality of opportunity which has always been built into certain progressive, liberal views of the world that wishes to believe in the overwhelming importance of the environment in determinism. (IP)

**CRITICAL MASS:** 1. The minimum quantity of fissile material required for a nuclear chain reaction. (See CHAIN REACTION, NUCLEAR WEAPONS) 2. The minimum amount of people with shared understanding or needs to tip the balance and instigate change. (See THRESHOLD, FEEDBACK) 3. A large cyclist gathering and rally promoting bicycle safety, road access for bikes and pollution-free transport, the monthly 'Critical Mass' is a self-organizing community campaign, a bit like 'Reclaim the Streets' for pedestrians. T(MP)

**CRITICAL NATURAL CAPITAL:** Natural capital and environmental assets essential to the functioning of the life support services supplied by ecosystems. These non-substitutable components of the global environment must be conserved for human survival and wellbeing. Human uses and values are ultimately dependent upon the primary values of ecological systems. Biogeochemical cycles, keystone species and the ozone layer are examples of critical natural capital. (See NATURAL CAPITAL) (MP)

**CRITICALLY ENDANGERED:** A species or other taxon which is at extreme risk of becoming extinct in the wild in the immediate future. This may be indicated by any of the following measures: a) a previous or projected population reduction of at least 80% over whichever is longer of a period of 10 years or three generations, b) extent of occurrence less than 100 km<sup>2</sup> or area of occupancy less than 10 km<sup>2</sup>, along with population decline, fragmentation or extreme fluctuations, c) population less than 250 mature individuals with continuing decline, d) population less than 50 mature individuals, or e) probability of extinction in the wild estimated at 50% over the longer of 10 years or three generations. (See ENDANGERED SPECIES, VULNERABLE SPECIES, GHOST SPECIES, EXTINCTION) (MP)

**CRITICALLY ILL :** See CHRONICALLY ILL, EMERGENCY CARE, INTENSIVE CARE UNITS, TERMINALLY ILL .

**CROSS-SECTIONAL STUDY:** A cross-sectional study or survey examines the range across a broad subject at a certain time, compared to a longitudinal study which is across several time intervals. (See LONGITUDINAL STUDY) (MP)

**CROSSING OVER:** The breaking during meiosis of one maternal and one paternal chromosome, the exchanging of corresponding sections of DNA, and the rejoining of the chromosomes. (DM+GK)

**CRYOBIOLOGY:** (Greek: *kryos* 'cold') Refers to the technology of freezing and thawing of biological tissues, particularly of gametes (sperm and oocytes) and embryos. Although the deep freezing of sperm was developed early in the 1900s, the successful freezing and thawing of oocytes and embryos is a relatively new technology. The first successful freezing and thawing of mouse embryos was reported independently in 1972 by David Whittingham and Ian Wilmut and paved the way for the first human frozen embryo born in 1983 in The Netherlands, and the second in Australia in 1984. (Greek *kryos* cold) (see CRYOPRESERVATION). (IP)

**CRYOGEN:** (Greek: *kryos* 'cold' + *genein* 'to produce') A chemical such as dry ice (solid carbon dioxide) that induces freezing which is commonly used to destroy diseased tissue without injuring the adjacent structures as used in cryosurgery (Greek *kryos* hidden + *genein* to produce) (see CRYOBIOLOGY AND CRYOPRESERVATION). (IP)



**CRYOGENICS:** The science of producing very low temperatures, as well as the applications, phenomena and technology pertaining to those temperatures. Applications include cryobiology, cryosurgery and the cryopreservation of biological samples. Some hopeful terminal patients have also been placed in cryonic suspension, involving deep freezing of their bodies or brains for future resuscitation in an era of more advanced medicine. (See CRYOBIOLOGY, CRYOPRESERVATION, CRYOGEN) (MP)

**CRYOGENIC ENGINEERING :** A section of engineering to study operations of engineering devices at a very low temperatures- cryogenic engines in space flights. (JA)

**CRYONICS:** See CRYOGENICS.

**CRYOPRESERVATION:** A hi-tech methodology involving the use of liquid nitrogen to preserve living organisms/parts (sperms/eggs/embryo) with a possibility of revival to life at a later date. A method of preserving cells, tissues and organs in a viable state by freezing. The basis of the technique is to allow cooling to take place at a carefully controlled rate in the presence of cryoprotective agents; that is, antifreezes such as dimethylsulphoxide with the aim to subject, an embryo for example, to controlled desiccation thus preventing fatal damage by the formation of ice crystals. Once deep-frozen the gametes/embryos may be stored indefinitely in liquid nitrogen **at a temperature of minus 196 degrees Celsius** . Cryopreservation is particularly important in the context of the preservation of endangered species (see CRYOBIOLOGY). (IP+JA)

**CRYOSPHERE :** The Earth's snow and ice masses (see BIOSPHERE, HYDROSPHERE & EXOSPHERE). (IP)

**CRYOTHERAPY :** A condition of hypothermia created during major surgical operations so as to decrease the oxygen requirement of a patient. (JA)

**CRYPTIC:** (Greek: *kryptos* 'hidden') 1. something secret or concealed 2. in the medical sense pertaining to a disease of unknown cause such as in cryptogenic infection - caused by pathogenic microorganisms of unknown origin 3. in the biological sense the cryptic appearance of an animal, the chameleon for example, refers to the resemblance of it to some part of the environment which helps it to escape detection by predators (Greek *kryptos* hidden). (IP).

**CRYPTOGRAPHY :** Crypto = hidden, graphy = writings. With the use of coded language, secret messages can be sent and the codes are deciphered to read the actual message. (JA)

**CRYSTAL METH :** See Amphetamines.

**CSIRO:** Commonwealth Scientific & Industrial Research Organisation (Australia).

**CUCKOLD :** Derogatory term for a man whose wife or partner has committed adultery; an allusion to the surreptitious parasitic nature of the cuckoo, whose eggs are raised in the nest of another bird. (See ADULTERY, OPEN MARRIAGE) (MP)

**CULTIVAR:** An international term denoting certain cultivated plants that are clearly distinguishable from others by one or more characteristics and which when reproduced retain those characteristics. A cultured variety of plant. In the USA "variety" is considered to be synonymous with cultivar (derived from cultivated variety). Cultivars are also called <sup>^</sup>straiqn<sup>^</sup>. In closely related species although a few genetically distinct features can be recognized, the differences are not strong enough to consider them as two different species. This word is commonly used in plant breeding and in the culture of microorganisms. (DM, JA).

**CULTURAL EVOLUTION:** Culture evolves and technology progresses, with cultural evolutionary mechanisms analogous but different to those of biological evolution. Investigators of evolutionary aspects of culture have included philosophers (e.g. Lewis Morgan, Arnold Toynbee, James Baldwin, Thomas Kuhn, Daniel Dennett, Jared Diamond), social Darwinists (Herbert Spencer), linguists (Noam Chomsky, Steven Pinker), environmentalists (E.F. Schumacher), biologists (Richard Dawkins), sociobiologists (F.T. Cloak, E.O. Wilson) and technologists (Eric Drexler, Marvin Minsky). Cultural evolution differs from biological evolution in its fast rate, directedness, and Lamarckian ‘copy the product’ inheritance amoete for survivalion, globalization, westernization and urbanization. More ‘modern’ may not equate with ‘better’, as im and IGM, SEMIOTICS, ETYMOLOGY, MULTIMODAL COMMUNICATION, MODERNIZATION, GLOBALIZATION, WESTERNIZATION, INDIGENIZATION, TECHNOLOGY, MIDDLE WAY) (MP)

**CULTURAL HERITAGE:** Cultural heritage sites include the significant monuments, architecture, artistry, archaeology, artifacts and other human works of outstanding universal value from the point of view of history, art or science. The conservation of cultural heritage is achieved at a local level with organizations such as the National Trust of Australia, and internationally as outlined in the 1972 UNESCO Convention concerning the Protection of World Cultural and Natural Heritage. The less tangible forms of cultural heritage - beliefs and practices handed down by generational transmission, must be conserved by recording indigenous knowledge into permanent written form, and by maintaining cultural diversity itself. (See HERITAGE, NATURAL HERITAGE, WORLD HERITAGE) (MP)

**CULTURAL IDENTITY:** The cultural background and behavioral distinctiveness an individual tends to be associated and identify with. Cultural identity is a mixture of history, social mores, cultural values and spiritual belief. Using the Australian example, Aboriginal culture may identify with life on the land, local community, respect for elders, and the ancestral Dreamtime. Members of the ‘stolen generation’ adopted into whi egalitarianism, TURE, MULTICULTURALISM, MINORITY GROUP, BOAT PEOPLE, STOLEN GENERATION) (MP)

**CULTURAL IDENTITY :** Cultural identity is a form of collective identity which is focusing on culture. Whereas in a nation state, most of the citizens are having a sense of belonging (collective identity) resulting from a shared faith as a people, a common central government, constitutioal rights and some basic societal values, they can have various cultural identities (for instance, as Native Americans, African Americans, Irish Americans, and so on). (BP)

**CULTURAL PLURALISM :** The presence of multiple value systems within or among societies.(DM)

**CULTURAL RELATIVISM :** The idea that there are no absolute rights or wrongs, but what is right and wrong depends upon what is accepted in one's culture. It would follow from this doctrine that female infanticide is perfectly alright, just so long as one's culture accepts it. (FL)

**CULTURE – [Social meaning] :** The way people live in identified areas, times and settings (HT. Odum)\* sum total of cumulative processes and products of societal achievement. Includes: Folk - Customary attitudes and social norms and customs believed and practiced traditionally, e.g. Eastern practice of eating with hands; Technological - changes in customary attitudes and social customs due to advances in science and technology, e.g. Eastern practice of eating with fork and spoon.

Cultural lag: both folk and technological cultures do not keep pace with each other, a term proposed by F. Ogburn in 1922 to indicate the

difference between the two. Education and regulatory norms/practices are necessary to bridge the gap. (JA)

**CULTURE – [Scientific meaning]** : technique of growing cells/tissues/plants/microorganisms in sterilized liquid/agar gel media containing nutrients. **Tissue culture** - growth of plant/animal tissue in liquid medium, first practiced by the German botanist Gottlieb Haberlandt during 1902. **Meristem** : Extension of plant tissue culture, in liquid culture medium containing auxin and cytokinin, produces many new shoots from a single plant shoot apex. **Anther** : a recent technique, mature anthers are grown in tissue culture medium with vitamins and plant growth regulators, in dividing haploid pollen tube cells yields proembryos, with the rupture of pollen grain about 40 haploid embryos are released. (JA)

**CULTURE** : Everyone has a culture because culture is about people, how they live and interact with one another. There is also no indigenous culture without its spiritual traditions, social practices, beliefs and laws of behavior - whether it be the rite of passage into adulthood involving greater responsibility, or initiation rituals conferring the status of "wise elder" commanding a deeper service to the community. For our hunter-gatherer ancestors, the only means of passing on knowledge was by example, demonstration or word of mouth, and elders of a tribe were given special status as an acknowledgment of knowledge and experience. The Australian Aboriginal culture, for example, is contained within the Dreaming stories (see DREAMTIME and DREAMING). (IP)

**CULTURE JAMMING**: Strategic media manipulation and the re-application of advertising techniques and mass-media channels for activist, subversive or culturally reflective purposes. Culture jamming is social activism in the information age. Culture-jammers see themselves as communication strategists supplying sensitive information suppressed by mainstream media, spreading memes or media viruses towards the emergence of an alternative paradigm. Early examples might include Australia's *BUGA-UP* graffiti network, America's Hip-Hop culture, communi media channels with alterom mild political satire t Culture jammers are true mature strategy, direct criticism, defamation or any obvious confrontation which may provide impetus to counter-actions. (See MEDIA VIRUS, PROPAGANDA, HACKTIVISM) (MP)

**CULTURAL POLLUTION**: See WESTERNIZATION, PROPAGANDA, POSTMODERNISM.

**CUMULATIVE EFFECTS**: See SYNERGISM.

**CURE**: See PREVENTION.

**CURIE** : Unit of radioactivity defined as the quantity of any radioactive nuclide which undergoes  $3.7 \times 10^{10}$  disintegrations per second. (See RADIOACTIVITY; RADIATION; CURIE, MARIE; CURIE, PIERRE). (IP)

**CURIE, MARIE** : (1867-1934). Polish-French physicist, chemist. Co-discoverer with Pierre Curie of radium and polonium. Mari Curie was the first woman to win a Nobel Prize in 1903 for physics jointly with her husband Pierre and Antoine Becquerel (discoverer of radioactivity in uranium) for their work on radioactivity; and the first person to win a second Nobel Prize in 1911 in chemistry for her discovery of radium and polonium. In her pursuit to demonstrate that two uranium minerals - pitchblende and chalcocite - were more radioactive than uranium, she discovered the existence of two new highly radioactive elements, radium and polonium. At the time the harmful effects of radiation were not recognized, thus, no precautions were taken and it has been said that Marie's notebooks of this period are still too dangerous to handle. However, a quote from the preface of Pierre Curie's *'Collected Works'* may give the reader a flavor of the excitement that cutting-edge research may bestow *'I remember the delight we experienced when we happened to enter our domain at night and saw on all sides the palely luminescent silhouette of the products of our work.'* Marie Curie's major published work was the two-volume *'Treatise on Radioactivity'* (1910). Marie Curie died of leukemia. (See RADIOACTIVITY, RADIATION, CURIE; CURIE, PIERRE). (IP)

**CURIE, PIERRE :** (1859-1906). French physicist. With Marie Curie he subjected pitchblende (a uranium ore) to fractionation hoping to reveal a substance more radioactive than uranium. This research resulted in the discovery of radium and one of its transformations products polonium. In 1903 the Curies received the Nobel Prize for physics, it being shared with Antoine Becquerel who, in 1896, discovered radioactivity in uranium (Becquerel rays). Pierre Curie tragically died in a street accident. (See RADIOACTIVITY, RADIATION, CURIE; CURIE, MARIE). (IP)

**CURRENT BEST PRACTICE:** See BEST CURRENT PRACTICE.

**C-VALUE PARADOX:** The lack of correlation between the amount of DNA in a haploid genome and the biological complexity of the organism. (C-value refers to haploid genome size.) (DM)

**CYANOBACTERIA:** Photosynthetic bacteria formerly referred to as blue-green algae (Greek: *kuanos* blue), belonging to the kingdom Eubacteria and potentially the symbiotic progenitor to the chloroplasts of plants. (See ALGAE, BACTERIA, CHLOROPLAST, LICHENS). (MP)

**CYBER CRIME:** Crimes committed primarily through Internet contact include: credit card fraud, identity theft, child pornography, indecent chat-room behavior, software and media piracy, web-site vandalism, release of viruses and worms, spam marketing, invasion of privacy, cyber-spying and most forms of hacking and cyber warfare. The cyberian legal system has a hard job keeping up along the technology trail of software designers and hackers. (See HACKER, INTERNET PRIVACY, MEDIA PIRACY, CYBER WARFARE) (MP)

**CYBERIA:** The civilization developing in the online world of cyberspace. To some extent cyberia parallels and interacts with outside social reality, containing structures for business, education and entertainment. Its limitations are however not the physical environment and political authority, but the rather the capacities of technology and human imagination itself. The future nature of cyberia will be engineered by cyberians themselves. Increased computer power and improvements in virtual reality technology will make it a much grander and easier empire for many to spend larger amounts of time. Cyberian social organization has both democratic and anarchic elements. Its unruly networks include temporary autonomous zones and encrypted communities able to act as independent informational and political structures, whether they be cultural expressions, terrorist networks or sanctioned military science. (See CYBERSPACE, CYBERCULTURE, VIRTUAL REALITY) (MP)

**CYBERCULTURE:** The culture developing around computer technologies and within the cyberspace environment. Cyberculture is often characterized as a reflection of a fractured technocentric existence; individualistic, egalitarian, anti-authority, technologically enabled, chemically enhanced, postmodern, multimodal and multidimensional. The inhabitants of cyberia tend to be young and/or professional, sometimes internet addicts, activist hackers, pioneering cybernauts and nerd geniuses whose life revolves around access to information and technology. (See CYBERIA, CYBERPUNK, CYBERSEX, INTERNET ADDICTION, HACKER) (MP)

**CYBERNETICS:** (Greek: *kubernetes* "steersman" or "self-regulation") The branch of science concerned with communication and control systems in organisms and machines, and the common ground between biology and computation. Cybernetics incorporates the concepts of

feedback, homeostasis and neural networks. A cybernetic system involves a series of operations in which information gained at one stage can be fed back to modify later stages of the process. Such feedback allows control systems to check and adjust behavior as required. For example, the body's response to stress functions as a biological cybernetic system in which biofeedback from its subsystems act as a master was coined and developed by US mathematician Norbert Wiener (1894-1964), in his 1948 book of the same name. Another lar automata and artificial intelligence. (As an aside, these two geniuses - Wiener achieved his PhD by age 18 - are good feedback mechanisms to develop automatic anti-aircraft radar weapons and von Neumann worked on the development of the great insight into the development of artificial intelligence, with neural networks the basis of the "bottom-up" axis of biological cells with digital electronics and computer networks bionic and cyborg technology. For example, Tokyo University attachments to motor neurons, and recently others have been investigating whether living rat neurons can teach or control, BIONICS, BIOINFORMATICS, ARTIFICIAL INTELLIGENCE, PSYCHOKINESIS, TELEPATHY, GAIA HYPOTHESIS) (MP & IP)

**CYBERPUNK:** The genre of science fiction dealing with cyberspace environments and social organization within the virtual worlds of integrated computer networks. Cyberpunk is characterized by dystopian visions of a bleak technocentric future and anarchic cyberian societies, the darker electronic by-ways of which are frequented by techno-enhanced freaks and rebellious hackers. The genre reflects the visions and fears of the young, and addresses bioethical issues of control and autonomy in a future of irreversible integration of technology into human bodies and minds. (See CYBERIA, SCIENCE FICTION, DYSTOPIA) (MP)

**CYBERSEX:** The most significant proportion of web traffic consists of pornography and other sex-related content. Anonymity and interactivity has made cyberspace a haven for those interested in sex, whether it be finding a partner through chat rooms, cyber sexual harassment, or explicit pornographic material. If the internet is any guide, the development of virtual reality technology may also be driven by the sex industry. Teledildonics is a term used in virtual reality discourse which describes simulated sexual intercourse in cyberspace. This online sex may be with a designed artificial partner, or sex at a distance with a real person, making use of tactile clothing, sensory equipment and real-time interactive telepresence. (See VIRTUAL REALITY). (MP)

**CYBERSPACE:** A term apparently first defined in William Gibson's *Neuromancer* as "consensual hallucination", cyberspace is the hyperdimensional environment of the internet, virtual reality and the online experience. This digital turf is generated by integrated information networks and computer technology, but has the feel of a real but radical universe with its own laws, for example allowing dissociation from the body and identity. Cyberspace enables interpersonal exchanges without the limitations of time, place or race, through e-mail, videophone links, virtual conferences, translation software, voice recognition, multimedia, digital viruses, artificial environments, and even interactive touch and smell with recent virtual reality technology. It is a place characterized by freedom, vibrancy, individuality, intrusiveness, incongruent conjunctions of people and ideas and complex flows of information. Cyberspace is an artificial space divorced from biology and the surrounding environment but unlimited in its internal complexity. (See INTERNET, CYBERIA, CYBERCULTURE, CYBERWARFARE, WORLD WIDE WEB) (MP)

**CYBER SPYING:** See INTERNET PRIVACY.

**CYBERWARFARE:** The use of communications and cyberspace environments to disrupt enemy command and control systems, infiltrate sensitive intelligence information, disseminate decoy intelligence, infect/disable software networks, persuade troop surrenders, distribute

propaganda and other technological means, usually as an adjunct to more traditional means of warfare. (See VIRTUAL WARFARE, SPACE WARFARE, HACKER, HACKTIVISM) (MP)

**CYBOFREE** : Cybofree is a term used to indicate the futility with which the mind tries to achieve perfection by using the body as a facilitator of pleasure. When a cyborg body is created solely for the purpose of self-gratification (ie) using the body as a facilitator of pleasure, the mind experiences a false sense of freedom called CYBOFREE. Futility with which the mind tries to achieve perfection by using the body as a facilitator of pleasure. This term was coined by V.R. Manoj and Dr. Jayapaul Azariah in "Fantasy, Reality, Ethics and Education (FREE)" published in Eubios Journal of Asian and International Bioethics, November 2001. (VRM & JA ) <http://eubios.info/EJ116/ej116b.htm>

**CYBORG**: An organism or entity created by merging electronics with biology; for example a semi-robotic human. The term usually implies major integration of computer technology into living tissue such that biological limitations are transcended, rather than limited use of simple bionic technologies for the restoration of normal function. A recent example has been "remote controlled rats", directed by computer with the use of controlled stimulation of the brain centers which process the whiskers sense (to direct movement) and pleasure response (to control motivation). These semi-robotic rats may have uses for example in earthquake rescue, but could also be considered subjects of animal rights abuse. Another recent step has been a vision chip able to partially combat blindness by sending digitally video-recorded images directly to cybernetic attachments in the cortex of the human brain. Such technology not only has the capability to restore normal vision, but is also a first step towards infra-red, telescopic, microscopic or remote vision. Robotics experts such as Marvin Minsky and Hans Moravec imagine that the cyborg is the next phase of human evolution, endowing post-humans with incredible mental capacities, physical strength and longevity. (See BIONICS, CYBERNETICS, ROBOT, MICROCHIP IMPLANTS, TELEPATHY, PSYCHOKINESIS) (MP)

**CYCLOSPORINE**: An immuno-suppressive drug. This drug is of great importance to organ transplantation, because by suppressing the immune system of the organ recipient, it prevents rejection of the transplanted organ. However, cyclosporine does have problematic side effects. Much research is being done to discover a drug that can produce the immuno-suppressive effect with less extreme side-effects. (AG)

**CYSTIC FIBROSIS**: Disease which affects the sweat and mucus-secreting glands, resulting in chronic lung disease, pancreatic insufficiency, abnormally salty sweat, and in some cases, liver disease. (+DR) Its inheritance is autosomal recessive, with several hundred mutations found so far in the CFTR gene in the patients. The most frequent mutation, DF508, is present almost in every patient group around the world with, nevertheless, big differences in its frequency. In Caucasian population from Europe and USA, the frequency of DF508 as a cause of cystic fibrosis in patients varies from 45-88%, and in Latin America it varies from 25-66%. (See MUCOVISCIDOSIS, *IN UTERO* GENE THERAPY and EPIGENETIC) . (GK+DM)

**CYTOGENETICS** : Branch of biology uses cytological techniques as tool to study genetics. (JA)

**CYTOKININ** : A plant growth regulator. Hormone. Used in tissue culture, abundant in coconut milk. (JA)

**CYTOLOGY** : A branch of biology, study of cell system its structure and function. (JA)

**CYTOLYSIS** : Dissolution or disintegration of a cell (Lysis = to fractionate). (JA)

**CYTOPLASM(IC)**: The substance within a cell external to the nuclear membrane; pertaining to or contained in the cytoplasm. Cytoplasm is the portion of the cell containing the nucleus and other cell organelles. (DM+JA)

**CYTOPLASMIC TRANSFER** new assisted reproductive technology aimed at increasing the older woman's chances of bearing her own genetic child where the procedure effectively cytoplasm into her own egg or the transfer of her egg's nucleus to the vacant cytoplasm of a donor egg. (IP)

## D

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<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**DALIT:** The lowest class in the Hindu social structure. The Dalit are also called the "untouchables" and are considered to be beneath all of the castes. It is not clear that caste is an originally Hindu idea. It may have been imposed quite late in history. The Dalit liberation movement, founded by Dr. Babasaheb Ambedkar, has been working for the rights of the Dalit since the time of British rule. The Dalit Liberation Education trust, Chennai, has established various educational institutions, including a computer school, a catering school, and the Delta School of Nursing, to help advance the Dalit people. (FL)

**DANGEROUSNESS :** In law, the state of being likely to cause harm to oneself or to others. (DM)

**DAO DEJING:** See TAO TE CHING.

**DARWIN, CHARLES** (JA)

**DATA:** (Latin: *datum* "giving") Data (singular datum) are raw facts (usually numerical but also may be names etc.) which by themselves have no meaning until they are organized into a pattern or logical collection. At this point the data becomes information, which can then be used to describe an object, idea, condition or situation in the analysis of a problem. In computing, data are the facts upon which operations are performed, as opposed to the instructions in the program. (See STATISTIC, DATA BANKS, DATABASE, DATA PROCESSING) (MP & IP)

**DATA BANKS :** Collections of medical, genetic, or other records. (See DATABASE). (DM)

**DATABASE :** A large collection of organized data or information typically suitable for the processing by computer. Examples of databases are the gene sequences held in Genbank, or the database maintained by the National Center for Biological Information which stores all determined protein structures as three-dimensional coordinates of the constituent atoms. (See STATISTIC, DATA, DATA BANKS, DATA PROCESSING). (IP)



**DATA MINING:** The process of knowledge discovery or retrieval of hidden information from data banks and collections of databases. Initial steps involve selection and pre-processing by an expert in the appropriate knowledge domain. Then patterns are identified using tools and techniques such as filtering, transformation, induction, cluster analysis, discriminant analysis, fuzzy logic, computer algorithms, case-based reasoning, intelligent agents and artificial neural networks. Information gleaned from data mining may then be interpreted, evaluated, incorporated into the existing knowledge base and modeled. (See DATABASE, KNOWLEDGE ACQUISITION) (MP).

**DATA PROCESSING :** The sequence of operations involved in the manipulation of information by a computer, or other manual manipulation, in order to extract information and to achieve some form of order. (See STATISTIC, DATA, DATA BANKS, DATABASE). (IP)

**DDT** abbreviation for the polychlorinated biphenyl pesticide dichloro-diphenyl-trichloroethane. Owing to their estrogenic potency and biological stability, DDT and its major metabolite DDE (dichlorophenyl-dichloroethane) are implicated in many reproductive dysfunctions, best publicized being faulty calcium mobilization in egg shell production resulting in extinction or endangerment of birds of prey; such the bald eagle and the osprey. It is also believed by some scientists that the PCBs, such as DDT and DDE, may be implicated in falling sperm counts, increasing testicular cancer, hypospadias (abnormal penile development) and cryptorchidism (mal-descent of the testes) in humans over the last 50 years (see ENDOCRINE DISRUPTERS, POLYCHLORINATED BIPHENYLS & BIOMAGNIFICATION). (IP)

**DEA:** Drug Enforcement Agency (US).

**DEAD FETUS :** An expelled or delivered fetus which exhibits no heart beat or spontaneous breathing. A few organs/tissue/cells may show activity indicating that the individual part is alive for a period of time after the moment of death of the fetus. See LIVE ABORTED FETUS. (JA)

**DEAD SEA SCROLLS:** A collection of ancient scrolls found in 11 caves in Qumran, near the Dead Sea. These scrolls were discovered over 50 years ago by a Bedouin who was herding his goats. The find was a very rare one because these scrolls were written 2000 years ago, and parchment is a perishable material that generally does not survive many centuries. The climate of the Judean desert helped to preserve these scrolls over the many centuries. The language of the scrolls is generally Hebrew, although some scrolls were found to be written in Aramaic or Greek. The script is a variant of the one currently used to write Hebrew, although in a few texts an older script is also found. These scrolls were written between 100 b.c.e. and 100 c.e. by a group which lived in Qumran. Their lifestyle bears some similarity to a sect known as the Essenes in the writings of the historian Josephus Flavius, and so, the scrolls are often identified as Essene. The content of the scrolls is varied. Included are Biblical texts (Old Testament and Apocrypha), some of the commentaries of the Qumran sect on Biblical books, the rules and regulations of the Qumran sect, and correspondence. These texts are very important for comparison of Biblical manuscripts, knowledge of Hebrew of the 2nd Temple period, knowledge of 2nd Temple period Judaism, and knowledge of early Christianity and its early development. (AG)

**DEADLY SINS:** See SEVEN DEADLY SINS.

**DEAFNESS :** See HEARING.

**DEATH.** See BRAIN DEATH.

**DEATH PENALTY:** See CAPITAL PUNISHMENT.

**DEBUG:** To detect, locate and correct errors (bugs) that occur in computer programs. Bugs are minimized by parsimonious programming, and can be fixed by consumers downloading software patches and upgrades. More advanced antivirus software may be required in the case of infection by a computer virus or worm. (See BUG, COMPUTER VIRUS) (IP & MP)

**DECADENCE:** (Medieval Latin: *decadentia* "a falling away") Self-indulgent behavior usually characterized by wastefulness, moral corruption and cultural deterioration. The materialism, self-absorption and decline of religious values characterized by the West has inspired the term "Western decadence". To bridge this cultural divide, affluent countries can no longer remain apathetic to the needs of the poor, and neither can the limited Earth support a decadent lifestyle for all people of the world. (MP)

**DECEIVE:** 1. Mislead, persuade of what is false 2. Be mistaken or making general claims on the basis of partial knowledge. (IP)

**DECEPTION:** Written or oral communication to others of what one knows to be untrue or contrary to fact. (DM)

**DECIBEL:** Unit of volume or loudness; a whisper is about 10 decibels and pain becomes apparent at volumes greater than 120 decibels. Loud or continuous sound may be considered noise pollution. (See NOISE) (MP)

**DECIDUOUS FOREST:** Vegetation communities in which trees lose their leaves once a year during a beautiful 'fall'. Climate is typically moderate/temperate with rain and distinct seasons. Trees involved include oak, maple, hickory, chestnut and beech. (See HABITAT TYPES) (MP)

**DECISION ANALYSIS:** A strategy for decision making in which management alternatives are made explicit, probabilities assigned to chance events, and numeric values given to potential outcomes. (See DECISION MAKING). (DM)

**DECISION MAKING:** See DECISION SUPPORT SYSTEMS.

**DECISION SUPPORT SYSTEM:** A model, planning framework or analytical device, often software, applied to data as an aid in the processes of decision-making or problem-solving. (See EXPERT SYSTEM) (MP)

**DECISION THEORY:** See DECISION SUPPORT SYSTEMS, DECISION TREE.

**Decision Tree:** Graphical representation displaying options, risks and the decision-making sequence. Decision trees and decision tables are used for optimizing solutions when there are a limited number of alternatives and a single goal (multi-criteria decision analysis is used for decision-making with multiple goals). (See DECISION SUPPORT SYSTEMS, DECISION ANALYSIS) (MP)

**DECLARATION OF HUMAN RIGHTS:** See UNIVERSAL DECLARATION OF HUMAN RIGHTS.

**DECOMPOSITION:** The breaking down of dead organic matter into its constituent minerals and elements. The study of decomposition plays a part in ecology and in forensic investigations. 'Decomposers' such as fungi and bacteria play an important ecological role in the recycling of nutrients. 'Biodegradable' products should break down into organic molecules which can decompose. (See BIOGEOCHEMICAL CYCLE,

BIODEGRADABLE, FUNGI, FORENSIC SCIENCE) (MP)

**DECONSUMERISM:** See DEMATERIALIZATION.

**DEDUCTION:** Mathematical type reasoning, in which conclusions are derived from premises by means of established methods of reasoning. A classic example of deductive reasoning was Euclid's *Elements*, which is the basis for the geometry learned in schools to this day. Aristotle's *Prior* and *Posterior Analytics* set forth principles of deductive reasoning. A more modern example is *Principia Mathematica*, by Bertrand Russell and Alfred North Whitehead. Methods developed by philosophers, in exploring the theory of deduction over the years, formed the basis of the logic used today in computer science. This shows that not all philosophy is impractical. (FL)

**DEDUCTIVE REASONING:** The kind of reasoning used in deduction. (See DEDUCTION). (FL)

**DEEP BLUE:** 'Deep Blue' is the coming era of Artificial Intelligence. (See ARTIFICIAL INTELLIGENCE) (MP)

**DEEP ECOLOGY:** 1. A value system which assigns an intrinsic value to natural systems and places nature within a system of morality or ethics, and which recognizes the ecocentric nature of our existence and the synthesis and interrelatedness of human cultures with ecological environments. Deep ecology is one of the most ecocentric of the preservationist green ideologies, and may also be referred to as 'ecologism', 'deep green' or 'Gaian' viewmentnologREEN) (MP)

**DEEP DESIGN VALUE SYSTEMS:** Value systems which take into account the wider, long-term ecological issues of sustainability, esthetics and bioethics within the holistic framework of environmental management; for example by taking account of the fundamental importance of symbiotic relationships, a deep value system contrasts starkly with the simplistic and materialistically driven short-term approaches, which could well be described as "shallow design value systems" (see DEEP ECOLOGY). (IP)

**DEEP FREEZING:** Typically refers to the freezing of gametes (sperm and eggs) and embryos. Frozen human and animal semen are routinely used and more sophisticated techniques for eggs and embryos are being developed. The main ethical questions which arise in the context of human material are for how long gametes and embryos should be cryopreserved and what should happen to them if the donor(s) die. The Warnock Report (UK Committee reported in June 1984) recommended that storage of embryos could be for a maximum of 5 years and gametes for a maximum of 10 years and that said embryos and gametes could only be stored with the signed consent of the donors, and could only be used by the license holder responsible for storage for the purposes specified in the consent; for example, for infertility treatment or for research. The sale and purchase of human gametes and embryos should be controlled so as to avoid the risk of commercial exploitation. (See CRYOBIOLOGY, CRYOGENICS, CRYOPRESERVATION). (IP)

**DEGREE CENTIGRADE :** See CELSIUS DEGREE (C°)

**DEGREES OF FREEDOM:** 1. The statistical latitude available in a test of significance, related to the number of observations (n) in a data set. 2. More broadly, perhaps may refer to the degree of development of a country in relation to human rights and freedoms, as measured for example by the Human Freedom Index. (See ANALYSIS OF VARIANCE, HUMAN FREEDOM INDEX) (MP)

**DEINSTITUTIONALIZED PERSONS:** Persons who have been released from mental institutions. (DM)

**DEIST:** Natural religion of the eighteenth century, practiced by Alexander Pope (1688-1744) and Jean-Jacques Rousseau (1712-1778). (JA)

**DELETION:** Gene or DNA segment that is absent from a chromosome. Deletions of coding sequences usually lead to pathological phenotypes. Deletion of anonymous sequences are often retained as population markers during evolution. The counterpart of deletions are duplications of the same chromosomal region, which should statistically be equally frequent if no selective pressures operate on them. (GK)

**DELIBERATION:** Careful thought requiring a not insignificant amount of time. (MR)

**DELUSION:** (Latin: *deludere* "to cheat") Aberrant beliefs which are disproportionate to one's own knowledge and perception. Delusions may be symptoms of psernal force (schizophrenia). (MP)

**DELPHI METHOD:** A Delphi study is a method of reaching expert opinion on an issue of significance. A number of experts are consulted for their opinions, and the results are collated and returned for various revisions in an attempt to achieve relative agreement or consensus. (See CONSENSUS) (MP)

**DEMATERIALIZATION:** The process of reducing human consumption of materials. Although contrary to the current economic paradigm of growth, dematerialization will be essential for allowing equity of human wellbeing whilst conserving ecosystem life-support services in line with requirements for sustainable development. Eminent authorities such as the World Resources Institute and Wuppertal Insitute have cited the dematerialization requirement at Factor 10, or a staggering 90% reduction of current material consumption in developed countries. This was the central recommendation of the Factor 10 Club Carnoules Declaration in 1994. Factor 10 should be achievable using present technologies, and has been acknowledged by governments like Sweden, Denmark and Austria. There are lighter recommendations in the Club of Rome report '*Factor 4: Doubling Wealth - Halving Resource Use*' (1997). The dematerialization component of sustainability requires much work in the face of powerful growth-oriented global institutions and corporations. (See DEMILITARIZATION, OVERDEVELOPED NATIONS) (MP)

**DEMENTIA:** (Latin *de* 'out' + *mens* 'mind'). A progressive organic mental disorder characterized by deteriorated memory control, personality disintegration, confusion, disorientation and degeneration of intellectual capacity and function. Organic forms of dementia are generally progressive and incurable; however, recent studies have shown that about 10% of patients with dementia have conditions for which treatment can reverse the otherwise irreversible decline of mental function. Progressive dementia, known as senile and multi-infarct (arteriosclerotic) dementia, is most often diagnosed in the elderly. Kinds of dementia include Alzheimer's disease, secondary dementia resulting from another concurrent form of psychosis, senile dementia and toxic dementia resulting from excessive use of poisonous substances. (See PSYCHOSIS; Alzheimer's Disease; INSANITY ). (IP)

**DEMILITARIZATION:** Transition to a sustainable world involves reducing national emphasis on threat of force, arms races, conscription, weapons proliferation, defense spending, military-industrial economy, gun ownership and violent media. Demilitarization is re-allocation of technologies from defense to civilian applications. This can be economically successful, as with Japanese post-war electronic, mechanical and optical products, and Japan's Constitutional restricti to peacekeeping, homelandpeace building roles, to dons. (See DEMATERIALIZATION, PEACEKEEPING, NON LETHAL WEAPONRY, ALTERNATIVE PARADIGM) (MP)

**DEMOCRACY:** (Greek: *demokratia*, combining *demos* 'the people' + *kratein* 'rule') Government by the people; state so governed by direct or representative representation. The system of government first evolved in ancient Greece when all citizens, including the poor, had access to the market place where the orators spoke and the politicians stood and took part in the democratic processes for the election of their rulers [Greek *demokratia* where *demos* the people and *Kratein* rule]. (IP)

**DEMOCRACY PARADOX:** See WESTERN DECLINE.

**DEMOCRATIC** : literally: rule of the people. When it refers to a mode of governing in modern states, it describes a particular way of will formation that goes from the bottom up, that is, theoretically includes every citizen ("Citizen" does not coincide with "human being").

"Citizen" common the term "citizen" did not include individuals that were regarded as being of minor dignity, like women, slaves, peasants). Since the purest form of democracy, that is, the participation of every citizen in every single act of governmental will formation (see Jean-Jaques Rousseau, *Social Contract* ) is not feasible in modern states, when we speak of "democracy", we refection it and transparent court system is essential in a democratic system.

"Democratic" also refers to a mode of will formation in communities or *ad hoc* groups of people, which includes everybody in the decision making process, instead of subjugating the group to the rule of one. (BP)

**DEMOCRATIC** : "Demos" means people in Greek, and a democracy is a society ruled by the people. Some democracies, like ancient Athens, are "direct" in the sense that the people directly vote whether they are in favour of, or oppose a proposal. Direct democracy still exists in relatively small groups, like the New England town meetings, kibbutz meetings, etc. Modern states, however, are usually representative democracies, in which decisions are made by elected representatives. It is sometimes remarked that a democracy is dictatorship for four years. The idea of modern democracy developed together with the reorganization of church government during the 16th and 17th century Protestant reformation in Europe. The Catholic Church hierarchy ruled from the top down, by means of the priesthood, who essentially told the people what to believe. The Protestant reformers introduced an idea of the "priesthood of all believers". They believed that if you read the (Christian) Bible with faith, the Holy Spirit will enlighten you, and your interpretation will be as valid, or more valid than the priestly interpretations. This led to the idea that the congregation of believers has the major authority in church government. The people, in Protestantism, do not take orders from the priest, but appoint or hire a minister to help them with this religious needs. The minister can be hired or fired by the people. Political democracy is only a secular application of this religious idea, with elected politicians gaining their authority from the consent of the governed. Democracy has been strongly criticised by anarchists, who have argued that there is really no difference between monarchy, democracy, dictatorship, etc. In any system, they argue, those who are gifted at manipulating and exploiting other people will rule. The differences between "elected representatives", "nobility", "commissars" etc etc, are only differences in name. But in fact, the anarchists argue, they are all the same people. (FL)

**DEMOGRAPHIC VARIABLE:** An attribute of an individual for use in social surveys such as the census, demographic variables include such things as age, sex, marital status and standard of living. (See AGE/SEX PYRAMID, DEMOGRAPHY) (MP)

**DEMOGRAPHY:** (Greek: demos 'populace') Scientific study of human populations, for example size, structure, distribution and other population statistics. (See POPULATION) (MP)

**DEMONS:** Evil, supernatural spirits. (MR)

**DENDRITES :** are the processes or nerve fibers that carry impulses towards nerve cells. Each neuron has many dendrites. (See AXON, NEURON). (IP)

**DENDROCHRONOLOGY :** A study of the annual ring patterns in trees to date past events and past climatic conditions. (JA)

**DENSITY-DEPENDENCE** widely observed phenomenon in which populations of cells or organisms are naturally regulated - one or more factors act as (a) increasing brakes on population increase with increase population density, and/or (b) decreasing brakes on population increase with decreased population density. Bioethical concern point out how humans actively seek to avoid the natural controls of their own population size, whilst interfering with the life cycles of other organisms on an ongoing basis (see BALANCE OF NATURE). (IP)

**DENTISTRY:** See DENTAL ETHICS.

**DEONTOLOGICAL ETHICS :** Theories of ethics which hold that some actions are morally obligatory regardless of their actual or anticipated consequences. (See DEONTOLOGY). (DM)

**DEONTOLOGY:** A theory according to which actions are judged right or wrong based upon inherent right-making characteristics or principles rather than on their consequences. A branch of moral philosophy with emphasis on duty, rules and regulations, principles and moral obligations which govern ones" right action. (DM, JA)

**DEOXYRIBONUCLEIC ACID :** See DNA.

**DEPENDENT VARIABLE:** In statistics, the variable or attribute which is thought to be affected or influenced by the *independent* variable. The dependent variable is also known as the response variable or criterion. (See VARIABLE, INDEPENDENT VARIABLE ) (MP)

**DEPERSONALIZATION:** A loss of one's feeling of self of depersonalization of schizophrenia or severe depression in which there is a loss of emotional connection to important life events or personal qualities. (See DISSOCIATION, DESENSITIZATION) (MP)

**DEPRESSED IMMUNE SYSTEM :** pertaining to the condition where the general activity of the immune system is functioning inefficiently. The condition enables low virulent bacteria, viruses, yeasts and fungi to become established and cause infection. There are always organisms present in the body and the environment, which a healthy immune system can readily keep in check. Depression of the immune system may be caused by cytotoxic drugs, radiotherapy as in the treatment of cancer, anti-inflammatory drugs such as corticosteroids, diseases such as AIDS, leukemia, tumors of the lymphoid tissue, cancer and the use of unsterile syringes and unhealthy lifestyles such as encountered by drug addicts. (See IMMUNE SYSTEM, IMMUNITY, AUTOIMMUNE DISEASE, AIDS). (IP)

**DEPRESSION:** Depression is a mood disorder characterised by severe emotional disturbance due to feelings of sadness, despondency, dejection or despair. A minimal requirement for its diagnosis is set down by the World Health Organization in the International Classification of Diseases as "a period of at least two weeks in which there is a depressed mood or loss of interest or pleasure in nearly all activities". Causes of depression may include bereavement, illness, anxiety, relationship breakdown, postnatal stress, work or social failure, seasonally affective disorder, loneliness, life instability or low self esteem. The illness also sometimes has a hereditary component, and may be divided into

endogenous (implying a genetic predisposition), or reactive (induced by external life events). The condition may be difficult to diagnose as it ranges from mild melancholia (dysthymia) to major chronic depressive disorder. Common symptoms include: loss of interest in enjoyable activities, lowered initiative, inability to concentrate or make decisions, decreased efficiency, fatigue or sleep disorders, change in weight, sullen attitude, negativity, irritability, feelings of guilt or worthlessness, loss of hope, and possible contemplation of suicide. The majority of cases will undergo remission without treatment, however relapse is also common and a combination of psychological counselling and temporary drug treatment may be helpful (e.g. Prozac, Lithium or St John's Wort). Most important is addressing the underlying causes, people live.. Females seem twice as susceptible, though male statistics over recent decades, however it is not certain whether this represents a seasonal affective disorder, psychosis and dementia) (IP & MP)

**DEPRESSION ENDOGENOUS:** See ENDOGENOUS DEPRESSION.

**DEPTH OF COVERAGE:** See BREADTH OF COVERAGE.

**DESCARTES, RENE:** (1596-1650) French mathematician, physicist and physiologist, who wrote philosophical treatises (The Discourse on Method and the Meditations on First Philosophy) to attempt to make his science palatable to a religious and university world in which Aristotelian philosophy and science were so entrenched that they were almost regarded as inseparable parts of Christian doctrine. Descartes is regarded as the modern father of "dualism", the idea that we have both souls and bodies. It is generally accepted that, in Descartes' philosophy the soul and the body have equal status, or perhaps the soul is even more important. But his "real distinction between soul and body" really opens the way for a mechanistic scientific approach in which we can study the workings of the body through Cartesian physiology and mathematical physics with no need to take the soul into account. So perhaps Descartes is more the father of modern secular science than of spiritual philosophy. But Newton's fame quickly eclipsed that of Descartes.

Descartes lived at a time when sailing ships and empires were increasingly opening contact and trade with Asia. He called his major philosophical work: "Meditations", and in it he tries to forget by doubting, at least temporarily, his education, his cultural heritage, indeed to empty his mind of thoughts, imaginations and memories, until enlightenment in the form of what he called "clear and distinct ideas", should finally appear. The similarity to Zen and to the Tao are too great for so many years to have passed without someone's writing a doctoral thesis exploring the connexion. (FL)

**DES** see DIETHYLSTILBESTROL.

**DESENSITIZE:** (Latin: *de* "away from" + *sentire* "feel"). 1. In biology, to render an individual less sensitive to, for example, specific allergy-producing antigens. 2. In psychiatry, to relieve an emotionally disturbed person by encouraging discussion about their traumas, phobias or neuroses and their possible origins. 3. In relation to the effects of media and culture, to decrease the normal responses of shock or disgust as a result of repeated exposure to images of violence without showing their explicit consequences (See DESENSITIZATION.) (MP)

**DESENSITIZATION:** (Latin: *de* "away from" + *sentire* "feel"). A technique used in behavioural therapy for the elimination of maladaptive anxieties associated with phobias and neuroses. Psychological trauma, feelings of shame or revolt from acts of violence, and inhibitions to aggression can also be decreased as a result of desensitization of the normal reactions due to frequent exposure. Such desensitization can result from repetitive violence without apparent consequences in media such as movies and video games, as well as various techniques common in military training. (See DEHUMANIZATION, DEPERSONALIZATION, DESSENSITIZE, VIOLENT MEDIA) (MP)

**DESIGNER BABIES :** See EUGENICS.



**DESIGNER DRUGS** : Term coined by pharmacologist Gary Henderson referring to the use of chemical technology to illicitly produce drugs of abuse; such as methamphetamines etc. Such designer drugs and their variants are tested - self-tested - despite unknown toxic effects. Additionally the compounds manufactured are not standardized with respect to potency risking harm and death by overdosing. The major aim of this secret industry is to invent lucrative drugs not already covered by legal prohibition, however, new laws attempt to control all compounds with mood-altering intent. (See RECREATIONAL DRUGS, ECSTASY). (IP+MP)

**DETERMINATION OF DEATH** : Use of cardiorespiratory and/or neurological criteria to establish whether death has occurred. (See BRAIN DEATH). (DM)

**DETERMINISM**: The theory that for every action taken there are causal mechanisms such that no other action was possible. Determinism is the denial both of free choice and of randomness. Everything is determined in advance. There are at least three kinds of determinism: logical, theological and scientific.

*Logical determinism* is based on the Aristotelian Law of the Excluded Middle. There is no middle ground between truth and falsity. Any statement is either true or false. So a statement like "By the end of the 21<sup>st</sup> Century, human cloning will be widespread and legal in most countries", is already true or already false. We just don't know which. So there is no free choice about this matter or any other. Aristotle tried to avoid this problem, and to save free will, by declaring that the Law of Excluded Middle does not apply to contingent statements about the future. Those who believe in free will may applaud Aristotle, while those who do not may call his tactic artificial and unwarranted.

*Theological determinism* says that God already knows the future. Therefore, since God knows what we shall do tomorrow, tomorrow is already determined. Although we may be aware of ourselves actually making choices, God knew in advance exactly what choices we were going to make.

*Scientific Determinism* says that everything, which happens in the world, follows necessarily from the laws of science. Since we are ultimately composed of subatomic particles, our actions are the necessary outcome of the laws of particle physics. (See biological determinism). (FL)

**DEVELOPED NATIONS**: Since this description of the First World is based around the achievement of wealth, wellbeing and some approximation of freedom and democracy, it is convenient to extend the continuum to point out that in many respects countries may be *over* developed, or wastefully rich and self-interested to the detriment of equity, other nations and the global environment. (See OVERDEVELOPED NATIONS, FIRST WORLD, NORTH, DEVELOPMENT, DECONSUMERISM, DEVELOPING NATIONS) (MP)

**DEVELOPING NATIONS**: Common descriptive term for countries with less economic wealth or social wellbeing with an emphasis on progress and the processes of development. Terms for developing nations have propagated in the search for political correctness and the right spin. The 'Third World' descriptive system has endured despite criticism, geographical reorganization and diminution of the Second World. 'South' is various terms such as 'Less Developed Country', 'Newly Industrialized Country' and 'Emerging Economy' have been used in different contexts. It is ironic that some economically-minded commentators consider the stagnating 'Fourth World' as not implied by the term 'developing' - where it more on ING, SUSTAINABLE DEVELOPMENT) (MP)

**DEVELOPMENT**: (French: *développer* 'to unfold') 1. Biological level ANOMALY, DEVELOPMENTAL POTENTIAL, GROWTH, LIFE CYCLE, ONTOGENY) (IP)

2. Environment and socioeconomics: Progress which increases the wellbeing of humans and the environment. Development is any activity or

process which increases capacity to meet ecological needs and human quality of life. Too often it is accidentally or deliberately confused with the concept of growth, in particular economic growth including consumerism, commercialism, environmental destruction and demoralizing industries. Development has also been defined in many other more positive ways: poverty-reduction, modernization, infrastructure, more jobs and income, higher standards of living, more equity, democratization, increased freedom, fair trade, institutional reorganization, shift from capitalist modes of production, and socioeconomic transformation. It is internationally recognized that all large-scale development should adhere to 'sustainable' principles. (See SUSLTH, STATE OF THE ENVIRONMENT REPORT, DEVELOPING NATIONS) (MP)

**DEVELOPMENTAL ANOMALY** : Any congenital defect; such as congenital heart defect, spina bifida, intellectual disability, that results from a disturbance of the normal processes of growth and differentiation during the embryonic and/or fetal periods. (See DEVELOPMENT; DEVELOPMENTAL POTENTIAL; TERATOLOGY; TOXICOLOGY). (IP)

**DEVELOPMENTAL PHYSIOLOGY**: The study of the physiological processes as they relate to embryonic and fetal development. (See DEVELOPMENT; DEVELOPMENTAL POTENTIAL). (IP)

**DEVELOPMENTAL POTENTIAL**: The full expression of an organism's latent genetic capacity. Any child's genetic potential is determined by the product of genetic endowment and by the environmental conditions, especially during prenatal development. Since the reproductive health of the parents can improve or undermine the expression of their child's genetic potential, planned pregnancies (that is, the conscious separation of fertility from sexual pleasure) should become the ethically acceptable norm. Major reproductive health determinants are lifestyle, socioeconomic conditions, medical knowledge and available services. (See INTRAUTERINE GROWTH RETARDATION; ADDICTION; PREMATURITY; SUDDEN INFANT DEATH SYNDROME). (IP)

**DEVIL**: An evil angel. If there are spiritual beings at all, there is certainly no evidence that all of them are good. There might be some bad ones, who give people bad advice. It is not, therefore, clear that those people who are, or who claim to be "spiritual" are any more ethical than those who are not. So-called "spiritual" people, if they are not deluded, do not necessarily receive their spiritual inspiration from healthy sources. (FL)

**DIABETES MELLITUS** : a complex disorder of carbohydrate, fat and protein metabolism primarily caused by a) the absence or malfunctioning of the beta cells in the islets of Langerhans of the pancreas resulting in a deficiency or complete lack of insulin secretion or by 2) defects of the insulin receptors resulting in tissues being unable to utilize circulating insulin. Insulin and glucagon (released by the alpha cells of the islets of Langerhans) are hormones that regulate normal glucose concentration in the blood. There are two basic types of the disease. Type I diabetes (also known as juvenile diabetes or insulin-dependent diabetes) affects 15% of diabetics. Typically this form develops in children or young adults and these individuals have a total or near total lack of insulin and consequently need daily injections of insulin to prevent a life-threatening condition called ketosis where glucose and acids reach dangerously high levels in the blood. Type II diabetes (also called mature-onset diabetes, adult-onset diabetes or non-insulin-dependent diabetes) usually develops after age 40 in typically obese victims. In type II diabetes insulin is synthesized but not in sufficient quantity to control normal blood glucose levels so prompt treatment may minimize diabetic complications such as diseases of the eyes, kidney and nervous system. Gestational diabetes greatly increases the risk of stillbirth, birth defects and the development of large overweight babies due to the mother's excess glucose levels affecting normal fetal growth. Viral infections at critical periods of prenatal or postnatal development may also be implicated in the onset of the disease. Diabetes is often

familial but a genetic predisposition is not the only factor since environmental and lifestyle variables interact with heredity to determine whether the disease will be expressed or not. The Australian Aboriginals have the highest rates of diabetes in the world where it is considered to be due to the abandonment of a traditional lifestyle in favor for a more sessile existence together with an unhealthy diet and excessive alcohol consumption. (See AUSTRALIAN ABORIGINAL). (IP)

**DIAGNOSIS** : (Greek *dia* 'thorough' + *gnosis* 'knowledge'). The process of identifying a disease or condition. In western medicine this is a procedure involving a medical history and listing the patient's symptoms, physical signs and results from the laboratory analysis of blood, urine, tissue biopsy or other substance which may identify clinical signs of disease. The final stage is to assemble all the relevant information in order to decide whether it fits a known pattern of disease. (IP)

**DIAGNOSTIC GENETIC TESTING** : Use of genetic testing in a symptomatic patient to aid the doctors in their diagnosis, treatment and management of the disease. (JA)

**DIALYSIS** : Dia = two, lysis = separate, Separation of soluble substances from colloids by diffusion through a semi permeable membrane, to dialyze (verb) to pass through a semi permeable membrane. (JA)

**DIAZEPAM** : A benzodiazepine sedative and tranquilizer traded under the name of Valium. It is predominantly prescribed in the treatment of anxiety, nervous tension, mild depression and as an anticonvulsant for epilepsy and similar disorders. Among the more serious side-effects is its addictive property, and since the drug was popularly prescribed even overprescribed to alleviate minor complaints and dissatisfactions numerous patients became dependent on the drug. (IP)

**DICTATOR**: Absolute ruler. Now generally used pejoratively though benign dictators exist, though rarely. (MR)

**DICTATORSHIP** : When dictatorship relates to a mode of governing in modern states, it labels the unrestricted power of one person (or a group of individuals), who actually monopolizes and exercises all political powers. Dictators shape rules without being subjugated to them, and their actions cannot be sanctioned by anyone. All these features stand in sharp contrast to DEMOCRACY. Dictatorship can also refer to a particular mode of exercising power within a community or an *ad hoc* group of people, which is unrestrained by exterior forces and not dependent on the will formation within the group. (BP)

**DICTIONARY**: See LEXICOGRAPHY.

**DIDGERIDOO**: traditional Australian Aboriginal wind instrument from the Northern Territory made from a witchety grub-hollowed out tree trunk and emitting a mesmerizing drone. The modern perception that all Aboriginal people played didgeridoo is based on stereotypes rather than fact as its use was limited and women were not permitted to play the instrument. Nowadays it's a most popular instrument instantly recognizable as Aboriginal whether solo, accompanying lyrics or orchestral. Contemporary music has extended the tradition and also has a place in modern political life (see MEN'S BUSINESS). (IP)

**DIETHYLSTILBESTROL (DES)** a synthetic non-steroidal hormone with estrogenic properties which was promoted between the late 1940s until its prohibition in the early 1970s for the treatment of women at risk of miscarriage. During that period its potent teratogenicity was discovered with the *in utero* exposed offspring suffering an increased incidence of a rare form of carcinoma of the vagina and cervix and a range of other reproductive abnormalities in both sexes. (IP)

**DIFFERENTIATION:** An increase in complexity and organization of cells and tissues during development. (JA)

**DIGITAL :** (Latin *digitus* 'finger'). 1. Pertaining to a digit; that is, finger or toe. 2. Using numerical numbers (digits - as in a digital watch) that show a signal in terms of a series of numbers rather than a continuously varying value. Digital devices work by a counting process either mechanical or electronic. Early calculating machines; such as the abacus, counted with mechanical relays while modern calculators are electronic circuits. (See ANALOG, COMPUTER, QUANTUM COMPUTING). (IP)

**DIGITAL FINGERPRINT:** An invisible code embedded into a copyright image or other intellectual property such that any unauthorized use can be traced across the internet, sometimes even if the image itself has been digitally altered. (MP)

**DILEMMA :** Two lemmas, i.e. two different conclusions. A dilemma is a situation in which one can equally well arrive at either of two mutually contradictory conclusions, or decisions as to action, from the same data. Bioethics is often taught as a series of dilemmas, such as "to abort or not to abort", "to turn off the ventilator or to keep it running". Although this is not the only way to approach bioethics, it is a legitimate way. (FL)

**DINOSAUR EXTINCTION:** See MASS EXTINCTION.

**DIPLOID:** A full set of genetic material (two paired sets of chromosomes), one from each parental set. All cells except sperm and egg cells have a diploid set of chromosomes. The diploid human genome has 46 chromosomes (see *haploid* .). A nucleus with two sets of chromosomes (2n). total chromosome number specific for each species, double = 2n. (DM, JA +GK)

**DIOECIOUS** are organisms, such as most animals and some plants like holly bushes, which have separate sexes where some of the individuals can produce only female gametes and others only male gametes (Greek *di* double + *oikion* house) (see MONOECIOUS). (IP)

**DIOXIN :** Dioxins such as TCDD (2,3,7,8-tetrachlorodibenzoparadioxin) are among the most dangerous of the persistent organic chemical pollutants, are highly toxic in small doses, and have been implicated as carcinogens and endocrine disruptors. Dioxins are a by-product of the chemical industry, contaminants of herbicides used in forestry and agriculture, and were a component of Agent Orange. Dioxin-containing compounds have been recognized as hazardous and phased out in much of the developed world. (See PERSISTENT ORGANIC POLLUTANTS, SYNTHETIC HORMONE DISRUPTORS, POLYCHLORINATED BIPHENYLS, AGENT ORANGE) (MP & IP)

**DIRECT ACTION:** Protests outside the institutionalized framework, for example grassroots activism, Greenpeace-style tactics, illegal public demonstrations, protest movements, computer hacking, stoppage of work, prevention of transport, 'locking on' to machinery, sabotage etc. (See NONVIOLENT DIRECT ACTION, ACTIVISM, HACKTIVISM, ECO-TERRORISM) (MP)

**DIRECTED DONATION :** Tissue or organ donation intended for the benefit of a designated recipient. (DM)

**DISADVANTAGED:** Persons lacking the basic resources or conditions believed to be necessary for an adequate standard of living. These may include, homeless persons, minority groups, etc. (DM)

**DISARMAMENT:** Conventions against *Nuclear Weapons* include: Strategic Arms Limitation Talks (SALT I and SALT II), Strategic Arms Reduction Treaties (START I, 1991 and START II, 1993), Nuclear Non-Proliferation Treaty (NPT, 1995), Comprehensive Nuclear Test Ban Treaty (1996).

Conventions against *Chemical and Biological Weapons* include: Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous and Other Gases and of Bacteriological Methods of Warfare (1925), Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (1993).

Conventions against *Land Mines* include: Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction (1997).

National commitments against *Missiles* have generally gone through the Missile Technology Control Regime.

Agreements or restrictions on manufacture and trade in *Conventional Weapons* have been made difficult by the right of nations to self-defense, and economic incentives in countries with an extensive military-industrial sector of their economy. The drive to disarmament and demilitarization (See DEMILITARIZATION, WEAPONS OF MASS DESTRUCTION, CONVENTIONAL WEAPONS) (MP)

**DISASSOCIATION:** See DISSOCIATION.

**DISCLOSURE:** Revelation of information, such as the risks and benefits or economic implications of clinical or experimental procedures, to help patients or research subjects make informed decisions. (DM)

**DISCOURSE:** Narrowly understood as talk but nowadays typically used much more widely to mean a whole way of thinking, understanding and even constructing reality, as, for example, in 'feminist discourse'. Habermas and others have used the phrase 'discourse ethics' when talking about the conditions (listening to others, being prepared to change one's opinions, etc.) that are necessary for valid debate among people preparatory to reaching a common ethical conclusion. (MR)

**DISCRIMINATION:** Selection between alternatives based on observable characteristics. Discrimination may be ethically appropriate or inappropriate. It is appropriate to discriminate in favour of a job applicant when she displays certain needed skills/abilities, e.g. excellence in teaching and research when appointing an academic, more than other candidates. With certain exceptions, it is inappropriate when the criteria used are such ones as sex, religion, ethnicity and age. However, there are many contentious areas. Is it acceptable to insist that airline stewards are below a certain age? Is it acceptable to favour Christian teachers for a Christian school? Will it be acceptable to test potential airline pilots to see if they have a genetic susceptibility to heart attack? (MR+GK)

**DISEASE:** Common-sense and widely used though difficult to pin down term generally held to mean either the absence of health or the presence of something that actively impairs full physical and/or mental functioning. Measles, cystic fibrosis and cancers are clearly diseases. But what about the menopause, crooked teeth or short stature? Without intending entirely to deny their objective existence, diseases are clearly also human constructions with a degree of cultural specificity. (MR)

**DISEASES OF ADAPTATION :** are stress-induced conditions; that is, diseases of exogenous non-infectious etiology such as hypertension, cardiovascular and renal dysfunction and gastric or duodenal ulcers. They are also sometimes called 'lifestyle diseases' (see GENERAL ADAPTATION SYNDROME, DISTRESS). (IP)

**DISORDER, GENETIC :** By characterizing the nature of the protein normally produced by the gene, greater understanding of the disease process can be obtained. Such an understanding help to assess the relationship of the protein to other body processes and how changes in the gene result in disease. These disorders in the genetic makeup of a person lead to disability and disease, see MULTIFACTORIAL

DISORDERS, LATE ONSET DISORDERS, AUTOSOMAL RECESSIVE DISORDERS AND AUTOSOMAL DOMINANT DISORDERS. (JA)

**DISPERSION:** See MEASURES OF DISPERSION

**DISPUTE:** Not as strong connotation as conflict, a dispute is an argument or debate, often involving material considerations, which can be settled by peaceful mediation, negotiation or legal means. (See CONFLICT) (MP)

**DISPUTE RESOLUTION:** See CONFLICT RESOLUTION

**DISSENT:** Difference in sentiment, such as an alternative opinion or separation from an established religion. Public dissent may be expressed in protest or activism, which require attention by the processes of democracy and peace building. (See ACTIVISM, PROTEST, PEACE BUILDING) (MP)

**DISSOCIATION:** (Latin: *dis* "apart" + *sociatio* "union") An emotional separation of normal thought processes from consciousness (dissociative disorder or reaction), for example in amnesia, somnambulism or lucid dreaming. Another form involves the splitting of individuality into multiple sub-personalities who may or may not be aware of each other, each with distinct behaviors and emotional development (dissociative identity disorder). (See DEPERSONALIZATION) (MP)

**DISSOCIATIVE IDENTITY DISORDER:** See DISSOCIATION.

**DISSOLVED OXYGEN (DO):** An important component of water quality, DO is a measure of the concentration of oxygen available for biochemical activity within a water body or sample. (See BIOCHEMICAL OXYGEN DEMAND) (MP)

**DISTRESS :** Unhappy stress from the Latin *dis* meaning negative. In biology stress is essentially reflected in the total rate of all the wear and tear caused by life and, although it is impossible to avoid stress, a lot can be learnt about how to keep its damaging side effects to a minimum. It is argued that many common diseases can be avoided if the adaptive response to stress were more moderate and thus better controlled. For example, many nervous and emotional disturbances, high blood pressure, gastric and duodenal ulcers, certain types of sexual dysfunction, allergic, cardiovascular and renal derangements appear to be essentially diseases of inadequate adaptation. It helps to know your personal strengths and weaknesses and so adjust your life, as much as is possible, to function within these constraints. In addition, the routine incorporation of knowledgeable nutrition and relaxation (meditation, sport, music) and the ability to reduce other sources of stress when subjected to a certain particular stress help to heighten eustress and conserve the body's energy for use in areas of maximum demand and effect. (See EUSTRESS; STRESS; GENERAL ADAPTATION SYNDROME). (IP)

**DISTRIBUTION:** See POPULATION DISTRIBUTION.

**DIVORCE:** Legal dissolution of marriage. In the UK and Australia, for example, irretrievable breakdown of marriage becomes the basis of divorce. The five main proofs of irretrievable breakdown are adultery, unreasonable behavior, desertion for two years, living apart for two years or when both partners consent to divorce. A divorce is granted provided the court is satisfied that financial and child-care arrangements are reasonable. (See MARRIAGE). (IP)

**DMT:** DMT is short for dimethyltryptamine, among the most powerful of the hallucinogenic recreational drugs. Usually smoked in a safe environment, its action is similarly intense but much shorter lasting than that of LSD. (See HALLUCINOGENS, LSD). (IP)

**DNA, DEOXYRIBONUCLEIC ACID:** The molecule that encodes genetic information. DNA is a double-stranded molecule held together by weak bonds between base pairs of nucleotides. There are four nucleotides in DNA: adenosine (A), guanosine (G), cytidine (C) and thymidine (T). In nature, base pairs form only between A and T and between G and C, thus the sequence of each single strand can be deduced from that of its partner. Deoxyribonucleic acid usually found in chromosomes, contains genetic triplet code - structure elucidated by Watson and Crick in 1953 Determines the sequence of amino acids in a protein. (DM, JA)

**DNA COMPUTER:** A computer which uses dissolved DNA molecules in a test tube for calculations rather than silicon chips (ordinary computers) or electrons (quantum computers). Leonard Adelman has demonstrated their efficacy at the University of Southern California. These energy-efficient machines are capable of performing multitudinous simultaneous calculations, providing enough power to crack codes and solve problems too complex for ordinary computing. Unlike quantum computers, they remain digital, with specific gene sequences coded as 1 or 0. Chemical processes are used for calculating, such as cutting DNA sequences with restriction enzymes and reproducing them with the polymerase chain reaction. Minor drawbacks include their technical intricacy, bulky proportions and the decay of DNA molecules, meaning that information cannot be stored for long periods of time data must be transferred to silicon computers for reliable memory. The principal drawback is their lack of versatility a unique sequence of chemical reactions is required to address each new problem, unlike all-purpose silicon computers. DNA computers may have applications similar to heavy-duty mainframe supercomputers. (See QUANTUM COMPUTING, MOLECULAR COMPUTER, COMPUTER) (MP)

**DNA DATA BANKS:** Collections of genetic information that are maintained for clinical, research, or law enforcement purposes. (See DATA BANKS, DNA FINGERPRINTING). (DM)

**DNA FINGERPRINTING:** A genetic identification procedure in which band patterns of DNA (the DNA fingerprint) from one individual or an unknown individual are evaluated for similarities with those of a known individual. Used in forensic medicine and immigration cases, and investigation of paternity. (See DNA DATA BANKS, GENETIC SCREENING). (DM)

**DNA HYBRIDIZATION TECHNOLOGY:** The formation of double-helix deoxyribonucleic acid from two complementary single strands. The technique is useful for comparing genome relationships between different species. Comparing human and chimpanzee DNA by the process of DNA hybridization, reveals that the DNA of humans and chimpanzees is much more similar (1.6% difference or 98.4% similarity in DNA sequences) than would be expected, given the considerable morphological differences between the two species. More recently, DNA sequencing of genes fully supports and adds detail to the data obtained from hybridization technology. (See RECOMBINANT DNA TECHNOLOGIES). (IP)

**DNA PROBES:** Segments of single-strand DNA that are labeled with a radioactive or other chemical marker and used to identify complementary sequences of DNA by hybridizing with them (see *HYBRIDIZATION* ). (DM)

**DNA RECOMBINANTS:** See RECOMBINANT DNA RESEARCH.

**DNA SEQUENCE:** The relative order of base pairs, whether in a stretch of DNA, a gene, a chromosome, or an entire genome. (DM)



**DNA SEQUENCING TECHNOLOGY:** See DNA hybridization technology.

**DNR (DO NOT RESUSCITATE):** A decision or order not to administer life-saving treatment, especially CPR, the next time a patient begins to fail. With respect to adults, and children sufficiently mature and intelligent to participate in the decision, it has been generally accepted that DNR is appropriate only if the patient has given an advance directive to that effect. But literature has begun to appear in which it is argued that even lacking such directives, staff and/or family can make these decisions if they clearly consider DNR to be in the "best interests" of the patient.

When the patient has not made an advance directive, a DNR decision involves grave seriousness. And even if the patient has made an advance directive, it is not always clear whether the patient's intentions apply at a certain time, or whether the patient may have undergone a change of mind. And in some countries (e.g. Israel) advance directives are not legally binding. In some places even a registrar can make a DNR decision with no need to consult others. In others, the hospital ethicist or ethics committee must be consulted. More attention might be paid to making DNR decisions ward decisions involving more than one physician, together with nurses, social workers and, of course, whenever possible the patient and the family.

Some bioethicists think that there should be international, or nationwide, or at least hospital-wide guidelines for DNR. But others think that the issue is so complicated and the differences among individual cases so subtly different, that it is healthy for each ward staff to exercise its own judgment and conscience. (FL)

**DO NO HARM:** The principle of 'doing no harm' or 'not doing harm' is generally thought of as perhaps the first duty of a doctor or other health professional and appears in the HIPPOCRATIC OATH (q.v.) in the form 'at least, do no harm'. (See *PRIMUM NON NOCERE* ). 'Doing no harm', or NONMALEFICENCE (q.v.), is also often thought of as a duty incumbent on all moral agents. Some moral philosophers recognise no distinction between nonmaleficence and BENEFICENCE (q.v.) - 'doing good' - but most hold that they are distinct, albeit complementary. In many countries there is a legal requirement for a person not to harm others, including strangers, whereas there are only rare circumstances in which a person is legally required to help strangers. (MR)

**DOCTOR-ASSISTED SUICIDE:** The taking of a lethal drug provided by a doctor for the purpose of ending the life of a terminally ill patient. Central to the euthanasia debate is the reduction of extended pain and human suffering. However, the legalization of euthanasia and the concept of assisted suicide have also highlighted the dilemma within medical ethics of whether or not assistance is a breach of the Hippocratic Oath and whether the application of advanced medical technology is a breach of patient autonomy. Most Western countries have passed laws making doctor-assisted, physician-assisted or medically-assisted suicide illegal. (See EUTHANASIA; SUICIDE). (IP)

**DOGMA:** An idea or doctrine which is not supposed to be questioned, if one is not to fall out of favour with a political, religious, scientific, medical, academic, etc., establishment. Dogmas are often false. But the fact that something is a dogma does not guarantee that it is false. Some dogmas are true. In science, Darwinian evolution is a kind of a dogma. But in some religious circles, its denial is a dogma. In medicine, the idea that brain death is really death is becoming a dogma. (FL)

**DOLLY:** A transgenic cloned farm sheep, produced by Dr. Ian Wilmut, Roslin Institute, Edinburgh, through a technique of somatic nuclear transfer in 1997. Died in 2003. See also TRACY and POLLY. (JA)

**DOLPHINS:** 32 species in 17 genera in the family Delphinidae and five species in four genera in the family Platanistidae. Some people believe that dolphins have similar intellectual abilities and complexities of social organisation to the Great APES (q.v.) and so deserve comparable ethical regard. Most biologists, though, hold that this overstates the mental faculties of dolphins. Large numbers of dolphins die in fishing nets put out to catch tuna and other fish. 'Dolphin-friendly tuna' sells well in some countries as a result of consumer objections to such deaths. (MR)

**DOMAIN:** 1. An area of land or habitat occupied by a particular individual or species. (See POPULATION DISTRIBUTION) 2. Descriptive term for a general collection of related pieces of information, usually studied by specialists within a particular profession; a 'domain of knowledge'. (See KNOWLEDGE) (MP) 3. A discrete portion of a protein with its own function. The combination of domains in a single protein determines its unique overall function. (DM)

**DOMINANT:** A trait or condition that is expressed in individuals who have a single version of a particular gene. (DM)

**DOMINANT PARADIGM:** The prevailing epistemological framework or world-view, entrenched in place by inertia, tradition and established institutions. The current dominant social paradigm is techno-centric, militaristic and capitalistic, based on hard energy and hard power, treats economics as an end in itself, condones competitive, complex and fast lifestyles, places a low value on nature by destroying it for economic growth, and places a low value on human compassion evidenced by a lack of concern for other species, other people or for future generations. (See PARADIGM, ALTERNATIVE PARADIGM, HARD POWER, HARD TECHNOLOGY, TECHNOCENTRIC, TECHNOLOGICAL DETERMINISM, URBANIZATION, INDUSTRIALIZATION, YUPPIE, DEVELOPMENT, PROGRESS, PROPAGANDA, DYSTOPIA) (MP)

**DON :** See FUNGAL TOXIN .

**DONOR CARDS:** Cards on which a person notes their preferences regarding donation of their organs after death. (See BRAIN DEATH, ORGAN TRANSPLANTS). (DM)

**DONOR GAMETES:** Eggs or sperm donated by individuals for medically assisted conception. (DM)

**DONOR INSEMINATION (DI):** also known as artificial insemination by donor. DI is the insemination of a woman with sperm from a donor other than her husband or defacto partner. DI is much more successful than husband/partner insemination with a reported 60% birth rate after six insemination cycles and is, therefore, one of the major treatments for male infertility. The technique is routinely used in Australia, Europe, and the US. As an example of its popularity, over 30,000 DI births were registered in the US in 1987. (See ARTIFICIAL INSEMINATION, ARTIFICIAL INSEMINATION BY HUSBAND). (IP)

**DOPAMINE :** Is a major neurotransmitter coordinating brain function through an extensive network of synapses. Dopamine functions as the messenger of the brain's reward system; that is, it generates the subjective feeling of pleasure or happiness and for this reason has been dubbed

the 'courier of addiction'. Heroin, cocaine, each drug's characterones that control tha and acute schizophly-induced manic-depressive psychosis. (See HAPPINESS; BRAIN NEUROTRANSMITTERS; LIMBIC SYSTEM; ADDICTION; SCHIZOPHRENIA). (IP)

**DOPE:** Colloquial for marijuana (or recreational drugs in general). "Dope" refers not only to the brain's dopamine neurotransmitter but also to the dumb or "dopey" behavior of the stoned marijuana smosarily the emotional mind and its creativity). For example memorization, sustained concentration and attention to arithmetic are temporarily disorganized. (See MARIJUANA). (IP+MP)

**DOUBLE BLIND EXPERIMENT:** An experiment or medical trial where neither the researcher nor the subjects know which treatments or placebos are given to which subjects. (See CLINICAL TRIALS, EXPERIMENTAL GROUPS, CONTROL GROUPS, PLACEBO) (MP)

**DOUBLE EFFECT, LAW OF or DOCTRINE OF or PRINCIPLE OF:** The theory that an evil effect is morally acceptable provided a proportional good effect will accrue, evil is not intended, the evil effect is not the means to the good, and the action is not intrinsically evil. (See AQUINAS, THOMAS). (DM)

**DOUBLE HELIX:** The shape in which two linear strands of DNA are bonded together. (DM)

**DOVE:** 1. A bird from several species within the pigeon family Columbidae, often smaller than the pigeons and white or blue-gray. A dove is said to have delivered an olive branch to Noah's Ark to indicate the end of the great flood. The dove is considered a symbol of peace, innocence and gentleness. 2. A colloquial term for a politician or international statesperscy, conciliation and peaceful resolution over threats of aggression or armed conflict. (See HAWK) (MP)

**DOWN'S SYNDROME:** Due to abnormal meiosis, non separation of a paired chromosome resulting in trisomy 21 aneuploidy in humans with 24 chromosomes. Symptoms mental retardation, mongoloid eyefolds, short stature, abnormal hands, feet and palm prints. See SYNDROME. (JA)

**DREAM:** (Middle English *dreem* 'joyful noise'). The manifestations of conscious thoughts, feelings and images during the rapid-eye-movement stage of sleep. Sometimes a dream may actually be acted out by the dreamer as in, for example, sleep-walking, sleep-talking and the performance of other acts during sleep which the dreamer has no recollection of on awakening. The whole question of the interpretation of dreams was put on a new basis in the 20<sup>th</sup> century by the work of Sigmund Freud and his followers. Freud and his school of psychoanalysts regarded the dream as the direct road to the 'unconscious' mind and consequently used it as a means to the patient's unconscious thoughts, emotions and illnesses. Dream analysis - the process of gaining access to the unconscious mind by means of examining the content of dreams, usually through the method of free association - is accepted as being a useful tool in psychotherapy. (See FREUD, SIGMUND). (IP)

**DREAMING ECOLOGY** see DREAMTIME

**DREAMTIME or DREAMING:** the Dreamtime refers to the beginning or Creation in the ancient past during which Australia was constructed as a land of hundreds of distinct Aboriginal countries. The Dreaming, on the other hand, refers to the ongoing connection over all time as defined by language, belief systems, cultural practices and social organization as guided by the spirit ancestors. The Dreamtime is the story of how the Spirit Ancestors created the land with its natural features, sky, sun, moon and star systems, all based on the understanding of Earth as Mother - the giver and provider of all life. The Dreamtime also provides the spiritual affiliation with the land and the method of

responsible custodianship to land which cannot be owned, sold or given away (see Corroboree; Sacred Sites & Totemism). Spiritual beliefs and practices vary widely among Aboriginal language groups, however, central to their spirituality is the identification with land and the Dreaming's creative force where land remains eternally sacred - the source from which the ancestral spirits continue to render to its people the biological and sowisdom for healthy living. The Dreaming, as representing a complex social organization of political systems and relationships of peoples to land and spiro assumed that the land was not being owned; thus he adopted the concept of Terra Nullius (land belonging to no one) and claimed Australia for the EmpireOW SERPENT; NATIVE TITLE LEGISLATION - AUSTRALIA & MABO CASE). (IP)

**DRIFTNETS:** Large gill nets of up to ten kilometers in length with floats along the upper and weights along the lower edge, designed to entangle fish whilst drifting in the current. When lost to the ocean, driftnets continue "ghost fishing" for long periods of time. Maligned as "walls of death" because of their large by-catch including marine mammals, their use on the high seas has been curtailed since 1991 by the Wellington Driftnet Convention and the 1993 UN General Assembly moratorium on large-scale driftnets. (See SUSTAINABLE FISHING) (MP)

**DRUG:** (French *drogue* "chemical material") any substance taken orally, or applied topically, or injected subcutaneously, intramuscularly or intravenously, or applied to a body cavity to treat or prevent a disease or condition. A drug when taken into the body modifies one or more of its functions. (See ADDICTION, RECREATIONAL DRUGS, DRUG ABUSE, harm minimization). (IP)

**DRUG ABUSE:** Drug abuse refers to the deliberate long-term self-administration of a recreational or medical drug with uncontrolled frequency, excessive dosage, and/or in combination with other drugs. This behavior is distinct from drug misuse, which is accidental or intermittent use of drugs in a way not prescribed by a physician. The adverse consequences of drug abuse may be the development of drug tolerance, dependence and addiction with resulting personal health and wider social impacts. There is also the view that under certain circumstances 'responsible' recreational use, or self-medication, of some substances where control over frequency and dosage is strictly maintained may, in fact, be efficacious and not necessarily adversely impact on the normal processes of life and health. In the latter instance the double standard is evoked when illegal drug use is automatically assumed to be drug abuse, and abuse in relation to legal drugs, such as nicotine and alcohol, is under-recognized. (See ADDICTION, RECREATIONAL DRUGS, DRUG TOLERANCE, DRUG DEPENDENCY). (IP+MP)

**DRUG ADDICTION:** See ADDICTION.

**DRUG CULTURE:** See RECREATIONAL DRUGS.

**DRUG DEPENDENCY:** A psychological and/or physical craving resulting from the body's reliance on the chemical substance(s). The condition is charats effects or to avoid withdrawal symptoms. (See addiction, DRUG TOLERANCE). (IP)

**DRUG INDUSTRY:** See PHARMACEUTICAL INDUSTRY.

**DRUG TESTING:** 1. Random mandatory drug tests in the workplace are becoming a common feature of corporate life in developed countries. This is considered by some an imposition on recreational freedoms, however may be justified especially in careers involving fair competition (e.g. sportspeople), considerable responsibility (e.g. politicians) or risk to human life (e.g. pilots). 2. Voluntary ecstasy-testing booths have been used to assess drug constituents and strength, for example in Dutch nightclubs as a harm-minimization initiative. (See HARM MINIMIZATION) (IP+MP)

**DRUG TOLERANCE:** Tolerance in this respect refers to the adaptation of the cellular biochemistry to accommodate a pharmacologically

active substance so that progressively larger doses are required to achieve the same physiological and/or psychological effects previously achieved from smaller doses. Tolerance management is an important concept for the occasional medicinal or recreational drug user. The maintenance of a low tolerance to a drug minimizes the loss of effectiveness, health impacts, monetary costs and likelihood of addiction. (See addiction, DRUG DEPENDENCY). (IP+MP)

**DUAL INHERITANCE THEORY:** refers to studies that view culture and genes as providing separate but linked systems of inheritance, variation, and fitness adaptations in order to yield distinct, but interacting, evolutionary change. Inheritance in this instance refers to the idea that culture is information that is acquired socially; i.e., non-genetic, contrasting with information acquired through genetically inherited mechanisms (see MEME; HUMAN BEHAVIORAL ECOLOGY AND EVOLUTIONARY PSYCHOLOGY). (IP)

**DUCHENNE MUSCULAR DYSTROPHY:** A genetic disorder. (See MUSCULAR DYSTROPHY)

**DUE PROCESS:** Legal procedures for the protection of individual rights in accordance with established standards of fairness and justice.

**DUPLICATION.** Gene or DNA segment that is found twice on the same chromosome. Multigenic families have evolved by duplication of an ancestral gene. Duplications can also be aberrant, in that they arise through chromosomal rearrangements during meiosis at particular breakpoint regions. (See also DELETIONS). (GK)

**DURABLE POWER OF ATTORNEY:** See ADVANCE DIRECTIVES.

**DUSTSTORMS:** Are an unwelcome feature of the weather over arid areas, particularly at times of draught. Due to the destruction of much of the vegetation and the drying out the land, duststorms in Australia have become more severe since European settlement illustrating the importance of land management in the fight against soil erosion and climate change. Overstocking and intensive agriculture can turn areas into dustbowls (see SOUTHERLY BUSTER). (IP)

**DUTY TO WARN:** A health professional's obligation to breach patient confidentiality to warn third parties of the danger of their being assaulted or of contracting a serious infection. (See CONFIDENTIALITY ).

**DWORKIN, ANDREA:** (1946- ). American feminist writer who portrays a deeply pessimistic view of modern society in which men are presented as constructing images of women that lead to hatred and violence such as rape, battering and psychological assault. These scenarios are described in her works *'Woman Hating'* 1974; *'Our Blood: Prophecies & Discourses on Sexual Politics'* 1976; *'The New Woman's Broken Heart'* 1980. Dworkin actively campaigns against pornography which, since it violates equal human rights, she regards as a foremost form of sexism. These social issues are dealt with in *'Take Back the Night: Women on Pornography'* 1980; *'Pornography: Men Possessing Women'* 1980. (See BEAUVOIR, SIMONE DE, GREER, GERMAINE, SEXISM). (IP)

**DYSGENY:** The decline of the quality of the species; used to describe the trend in urban industrial society where the "fast-breeding", relative to privileged families, of the urban population represents a perceived threat.

**DYSTHYMIA:** See DEPRESSION.

**DYSTOPIA:** (Greek: *dys* 'bad' + *tópas* 'place') Expom film include *'Metropolis'*, *'Alphaville'*, *'Akira'* and *'Blade Runner'*, and from literature include Dante's *'Inferno'* (c.1307); H.G. Wells' *'When the Sleeper Wakes'* (1899), Aldous Huxley's *'Brave New World'* (1932); George Orwell's *'Nineteen Eighty-Four'* (1949); and William Gibson's *'Neuromancer'* (1984). (See UTOPIA, CYBERPUNK, BIG

## BROTHER, NANOTECHNOLOGY WEAPONS, INSTITUTION OF WAR, HUMAN EXTINCTION) (MP)

## E

<a href="#">A</a>	<a href="#">B</a>	<a href="#">C</a>	<a href="#">D</a>	<a href="#">E</a>	<a href="#">F</a>	<a href="#">G</a>	<a href="#">H</a>	<a href="#">I</a>	<a href="#">J</a>	<a href="#">K</a>	<a href="#">L</a>	<a href="#">M</a>	<a href="#">N</a>	<a href="#">O</a>	<a href="#">P</a>	<a href="#">Q</a>	<a href="#">R</a>	<a href="#">S</a>	<a href="#">T</a>	<a href="#">U</a>	<a href="#">V</a>	<a href="#">W</a>	<a href="#">X</a>	<a href="#">Y</a>	<a href="#">Z</a>
<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**EARTH:** 1. Geology: The earth is the mineral component of the world; the soil, dirt, land, ground. 2. Mythology: one of the four ancient elements earth, fire, wind and water. 3. Astronomy: Deserving of a capital letter, 'Earth' is oatic some three billion years ago. (See EARTH FROM SPACE, ATMOSPHERE) (MP)

**EARTH FROM SPACE:** The Earth was viewed from space directly by a human for the first time with Yuri Gagarin in 1961. It has emotionally, spiritually and ethically inspired all those lucky individuals who have similarly witnesses it first-hand. Photos of the Earth as a single, limited, fragile entity floating in inhospitable space have circulated widely through the public consciousness since that time. The Earth from space has highlighted the insanity of the nuclear arms race, the fundamental limits to growth, and the possibility of human extinction, and has inspired the search for human unity and global sustainability. (See EARTH, SPACE) (MP)

**EARTH SUMMIT:** In 1992 in Rio de Janeiro, Brazil, the world's governments met in the United Nations Conference on Environment and Development (UNCED). Five major agreements came of this so-called Earth Summit:

Agenda 21 - a broad, 40-chapter statement of goals and potential programs related to sustainable development

The Rio Declaration - a brief statement of principles on sustainable development

The Biodiversity Treaty - a binding international agreement aimed at strengthening national control and preservation of biological resources

The Statement of Forest Principles - a non-binding agreement on development, preservation, and management of the Earth's remaining forests

The Framework Convention on Climate Change - a binding international agreement that seeks to limit or reduce emissions of gases associated with the potential for global warming. (RW)

**EASTERN PHILOSOPHY:** Buddhist, Hindu, Shinto, and other philosophies from South and East Asian countries are usually thought of as Eastern Philosophy. It is debatable whether there are common points uniting all Eastern philosophies and distinguishing them from Western

ones. (FL)

**EASTERN RELIGIONS** Religions originating in Asia, particularly those which originated in the subcontinent and eastward, and are not based upon Jewish, Christian or Muslim scriptures. Some Eastern religions have texts which are designated as sacred, others are based on oral traditions. (AG)

**EBOLA:** A type of flu like fever that causes hemorrhage. (JA)

**ECCLESIASTICAL:** of the Christian Church or its clergy. In ethics, the Church's inclination to pay close attention to ethical problems when they are ecclesiastical problems. (IP)

**ECHINODERMATA:** The phylum of exclusively marine, invertebrate animals characterized by radial symmetry, spiny skin, and an internal calcareous skeleton. Most are pentameral having five-fold symmetry. Commonly known echinoderms are starfish, brittle stars, sand dollars, and sea urchins. (RW)

**ECNC:** European Centre for Nature Conservation.

**ECO-:** (Greek: *oikos* "house") Combining prefix indicating ecology or an ecological component (e.g. ecocentric, ecotourism, ecocide). It is informative to note that both the words ecology and economy are derived from the same Greek root *oikos* ; eco-logy (- *logy* "the study of" from *logos* "word") being the scientific study of the house, and eco-nomy (from *nemein* "to manage") being the management of the house. It is therefore easy to see that the economy should be subservient to and dictated by ecology - rather than today's apparent economic orthodoxy of the other way around. (See ECOLOGY, ECONOMY) (MP)

**ECOBALANCE:** Ecological balance, Interaction between the environment and the living beings to bring about a steady-state - balance is not a point but a condition. (JA)

**ECOCENTRIC:** Viewpoint giving importance to ecological processes, living in tune with nature, an accent on ecobalance, recycling, conservation of natural resources. (JA)

**ECOCIDE:** Ecological genocide; the total destruction of the natural ecology and environment to make way for humans and their desires. Typically, ecocide tends not to have legal recognition as an atrocity or crime. (MP)

**ECOCUISINE:** (Greek *oikos* 'house' + French *coquere* 'cook'). The preparation and cooking of wild species, perhaps even ecologically endangered species. The underlying psychology of killing endangered species stems from the acceptance that humanity is prepared to nurture and protect commercially important species while it condones mass extinctions in the wild. The expectation is that once an ecologically unique dish has gained popularity, the species will be saved through efforts at sustained agri- aquaculture, domestication, or enhanced environmental protection. Several formerly threatened species; such as the crocodile, have been given a reprieve by enhancing their gastronomic attractiveness. (See SUSTAINABLE DEVELOPMENT PRINCIPLES; ECOLOGICALLY SUSTAINABLE DEVELOPMENT). (IP)

**ECOFRIENDLY:** A concept of living in consonance with nature, employing technology that preserves the beauty and integrity of ecosystem. (JA)

**ECOLOGICAL COMMUNITY:** 1. the assemblage of species that makes up the biota of a habitat. 2. a human settlement that tries to



minimize its adverse environmental impacts. (RW)

**ECOLOGICAL ECONOMICS:** See NATURAL CAPITAL, ETHICAL INVESTMENTS, ENVIRONMENTAL VALUATION.

**ECOLOGICAL FOOTPRINT:** A measure of consumption, our ecological footprint is an amount of land area which represents our resource use. Ecological footprint analysis converts our use of materials and energy into hectares of land per person required to provide these resources. It is an illustrative indicator of individual or collective human impact which highlights concepts such as natural capital, carrying capacity and ecological limits. (See CONSUMPTION, FLOWS) (MP)

**ECOLOGICAL HOTSPOTS:** See BIODIVERSITY HOTSPOTS.

**ECOLOGICAL INDICATORS:** See INDICATOR SPECIES, ENVIRONMENTAL INDICATORS.

**ECOLOGICAL INTEGRITY :** 1. The cohesion and intactness of the web of life comprising the ecological system - unpredictable consequences may arise from human disturbance of the ecological integrity. 2. An innate awareness of the total interdependence of living things functioning as both a scientific and philosophical moderator as expressed in the phrases ‘thinking ecologically’ and an ‘ecological point of view’. (See ECOLOGICALLY SUSTAINABLE DEVELOPMENT; GAIA HYPOTHESIS). (IP+MP)

**ECOLOGICAL JUSTICE / ECOJUSTICE:** A principle that links social justice with environmental quality, that which is due to the ecosystem. The right of each components of an ecosystem to be free from human exploitation and to be free from destruction, discrimination, bias and extinction. A principle that deals with solidarity of creation that ensures sufficiency and sustainability avoiding disposal of /poisonous/toxic/hazardous wastes like nuclear wastes that threaten the fundamental right to clean air, land, water and food. (JA)

**ECOLOGICAL LOCATION :** A composite expression referring to the combination of ‘location’ where the human and nonhuman is situated in the web of biotic communities, contrasting with ‘social location’ which is restrncentrates on the location of all the biosphere’s inhabitants and how these interspecies relatigy. (See SUSTAINABLE DEVELOPMENT; GAIA HYPOTHESIS). (IP)

**ECOLOGICAL NICHE:** A particular physical habitat or resource that is exploited by an organism. Niches often are defined in terms of food (e.g., carnivore or detritivore) or a functional role in an ecosystem (e.g., primary producer, consumer). (See NICHE, NICHE DIFFERENTIATION). (RW)

**ECOLOGICAL PROCESSES:** Ecological processes are the which Ecosystem services are They include environmental processes such as chemical transformation, phase transfer and mass transfer. Evolutionary processes include natural selection, punctuated equilibrium and speciation. Biological development processes include meiosis, mitosis, differentiation, growth and ontogeny. Human socioeconomic development introduces a whole new set of disruptive ecological processes, investigated by Environmental Impact Studies. (See PROCESS, ENVIRONMENTAL PROCESSES) (MP)

**ECOLOGICAL REHABILITATION:** See RESTORATION ECOLOGY.

**ECOLOGICAL SUCCESSION:** The sequence of ecological communities that grow in a habitat. Typically, a pioneer community becomes established after a disturbance. This pioneer community will be displaced by various successors until the establishment of a climax community, which, by definition, is essentially stable until the next disturbance. (RW)

**ECOLOGICALLY SUSTAINABLE DEVELOPMENT:** A variant of the term "Sustainable Development" emphasizing the underlying importance of ecological integrity to human life. The ecological component cannot however be separated from the economic and social components. Theoretically committed to the concept, the Commonwealth Government of Australia (1990) defined it as follows: "Ecologically sustainable development means using, conserving and enhancing the community's resources so that the ecological processes on which life depends, are maintained, and the total quality of life, now and in the future, can be increased." (See SUSTAINABLE DEVELOPMENT). (MP)

**ECOLOGISM:** A green philosophy which emphasizes the need for deep social, economic, political and environmental reform in preparation for a post-industrial sustainable future - in comparison to environmentalism, which involves reform within the boundaries of the current sociopolitical system. Ecologism has similar viewpoints to deep ecology, including recognitions of an ecocentric perspective, biophilia, limits to growth, and the radical restructuring of existing institutions and ideologies. (See DEEP ECOLOGY, DEEP DESIGN VALUE SYSTEMS, GREEN, ECOCENTRIC, BIOPHILIA, ALTERNATIVE PARADIGM, ACTIVISM, ENVIRONMENTALISM, DEMATERIALIZATION) (MP)

**ECOLOGY:** (German: *Ökologie* from Greek *oikos* "house") The branch of biology dealing with living organisms' distribution, behavior, mode of life and relations to their surroundings. The word was coined by the German biologist Ernst Haeckel in 1869, derived from the Greek root "oikos" which means "dwelling place, place to live, house" (i.e. environment). Defined as the study of the structure and function of nature in which human beings are a part. Ecology includes all the patterns of relationship between all organisms and their environments. (See ECO-, ECOSYSTEM, ECOSPHERE, ECOCIDE, ENVIRONMENT, HABITAT, ECOLOGICAL ECONOMICS, HUMAN ECOLOGY) (JA)

**ECONOMETRICS :** Application of mathematics and statistical principles in economics so as to test economic theories and their relationship and to make quantitative predictions. (JA)

**ECONOMIC EFFICIENCY:** See EFFICIENCY

**ECONOMIC GROWTH:** See GROWTH

**ECONOMIC SANCTIONS:** Economic sanctions have been questioned on grounds of effectiveness, equity and ethics. They impose budgetary losses to neighboring third-party states, or may involve unilateral political gain or manipulation. But most importantly, economic sanctions usually have a devastating effect on community health and wellbeing in the affected country. Limited resources may be disproportionately allocated to elites and the military, leaving innocent citizens to bear the brunt of the impacts of the sanctions. For example, the 'Oil for Food Programme' during United Nations sanctions on Iraq was inadequate to prevent an estimated 5,200 preventable deaths in under 5-year olds *per month* between 1991 and 1998 (UNICEF 1999) due to lack of access to basic facilities. (See SANCTIONS) (MP)

**ECOPHYSIOLOGY:** The branch of biology investigating the physiological structures, functions and adaptations which enable organisms to survive in interaction with their ecosystem and physical environment. (MP)

**ECOPSYCHOLOGY:** Psychological study of the human mind in relationship, interaction and affinity with nature. It has been a long-held theme that divorce from nature (or the natural order of things, e.g. *Macbeth*) may precipitate mental instability. This may be of relevance in this modern world of invented physical and virtual environments. (MP)

**ECOSPHERE:** biosphere is an ecosphere, meaning the existence of various types of habitats and biomes. Indicates the living relationship between all of earth's living beings with the physical environment. Ecosphere = Biosphere(JA)

**ECOSYSTEM** first proposed by the British ecologist A.G. Tansley in 1935. It is derived from two words, ecology and systems to mean ecological systems, shorted to ecosystem. A functional unit and a dynamic system. It signifies the interaction between community and abiotic components such as matter and energy. (See also MICROECOSYSTEM) (JA)

**ECOSYSTEM FRAGMENTATION:** Biodiversity impacts of ecosystem fragmentation include disruption of migration and foraging routes, reduced genetic exchange, isolation of ecological communities and exposure to edge effects, weed invasions etc. Experimental studies reviewed by E.O. Wilson suggest that a tenfold decrease in land area will approximately halve the number of species present, although the specific area-species curve is dependent on the ease of dispersal of given organisms. As with conservation of endangered species, focus has been on the *effects* of small size on population persistence, and must address the *causes* of such reductions in size and connectivity. These causes include expansion of human-dominated ecosystems, creation of edges (e.g. roads), creation of barriers (e.g. dams), land clearing, monoculture, hunting/harvesting, removal of food-web species, separation of mutualistic organisms, habitat competition from introduced species, introduced predators, and other ecosystem disruption and destruction. (See HABITAT FRAGMENTATION, HABITAT DESTRUCTION, EDGE EFFECTS, BUFFER ZONES, WILDLIFE CORRIDORS, RESTORATION ECOLOGY) (MP)

**ECOSYSTEM SERVICES:** Humans are ultimately dependent upon the functions and services of ecological systems. Ecosystem services are the supply and restoration processes essential to the functioning of the life. They may break down wastes (e.g. biogeochemical cycles), provide shelter, energy and oxygen (e.g. forests) or protect us in other ways (e.g. the ozone layer). Although usually taken for granted, these services are provided *free* by ecosystems, but end up costing heavily if damaged or destroyed. Essential ecosystem services are 'critical natural capital' which *must* be conserved to provide our global life-support system. (See CRITICAL NATURAL CAPITAL) (MP)

**ECO-TERRORISM:** The use of fear and violence in the cause of environmentalism or to save ecology facing destruction. Or more broadly, use of violence in *either* the activist protection *or* the commercial extraction of ecological resources. So-called eco-terrorist groups such as the Earth Liberation Front (ELF) may conduct illegal activities, usually against property, but lives are also confronted and lost as a result of ecocide, inappropriate technologies, habitat destruction, threats to biodiversity, justifications for war, and ironically some officially sanctioned fighting against illegal loggers and big-game wildlife poachers. (See ECOCIDE, HACKTIVISM, DIRECT ACTION, NONVIOLENT RESISTANCE, POACHING) (MP)

**ECTOMORPH:** A person with an extreme body type typified by thin frame, long limbs and narrow features. People with a high degree of ectomorphy may suffer from physical fragility, sunken features and difficulty gaining fat or muscle. (See ENDOMORPH, MESOMORPH,

ANOREXIA NERVOSA) (MP)

**ECTOPIC PREGNANCY:** A pregnancy that occurs outside the uterus, usually in a fallopian tube. (DM)

**ECOTOURISM:** There are a range of definitions. One definition is from Honey, M. *Ecotourism and Sustainable Development: Who Owns Paradise?* (Island Press: Washington, D.C. , 1999), " Ecotourism is travel to fragile, pristine, and usually protected areas that strives to be low impact and (usually) small scale. It helps educate the traveler; provides funds for conservation; directly benefits the economic development and political empowerment of local communities, and fosters respect for different cultures and for human rights. " (MN)

**ECUMENE:** (Greek: *oikoumenikos* 'of the inhabited world') The world environment habitable to humans, or populated/inhabited regions thereof. (See ECUMENOPOLIS, ANTHROPOSPHERE) (MP)

**ECUMENICAL:** 1. Universal humankind. (See ECUMENE) 2. Relating to or representing the world of the Christian Church. The ecumenical movement aims at the reunion of the Christian churches, e.g. in the World Council of Churches. (See RELIGIONS) (MP & IP)

**ECUMENOPOLIS:** Term coined by C.A. Doxiadis referring to a futuristic world-city or extended human settlement bounded only by climatic and topographical limits. (See ECUMENE, EKISTICS, MEGALOPOLIS) (MP)

**EDGE EFFECTS :** Ecological impacts typically initiated along edges or by the boundaries between natural and interrupted systems. For example, a road through a rainforest will create an edge which introduces light, pests, weeds, pollution, erosion, danger to wildlife, human access, and ultimately habitat fragmentation due to the altered ecosystem along that strip. (See HABITAT FRAGMENTATION, BUFFER ZONES, WILDLIFE CORRIDORS) (MP)

**EDUCATION:** (Latin: *educatio* "rearing" or "bringing up") Systematic instruction, usually of the young, which provides people with the knowledge, skills and wisdom necessary for them to become active members of society. In its widest sense education includes the life-long process of development and maturation, but is more officially restricted to those influences brought to bear on children, adolescents and young adults preparing for the workforce. In ancient times the Greeks were one of the first civilizations to provide schooling and organized instruction (education). Jewish education also developed early, following along the lines of Old Testament injunctions regarding the training of children, and the Arab world too was very scholarly. The 12<sup>th</sup> century saw the rapid development of learning in Europe during the Renaissance, heavily indebted to both Arabic and Hebrew scholarship. With the rise of Christianity, schools were instructing this religious doctrine as well as subjects such as the liberal arts, grammar, logic, arithmetic and music. The most famous university was in Paris, the chief center of philosophy and theology, while the prototype universities were England's Oxford and Cambridge. In Catholic countries the church maintained control of education until more recently. By the 19<sup>th</sup> century new approaches were coming to the fore, heralding, in the 20<sup>th</sup> century, a wide variety of secular institutions such as Montessori schools and Progressive Education Movements which allow practical, self-paced development. It is now generally recognized that the state has a duty to provide education for all its citizens, for example the United Nations Development Programme's Human Development Index uses adult literacy and education enrolment as two of its four measures. Most of the trends are for increased up-front fees for attendance at the tertiary (university) level. Australia, for example a non-discriminatory scheme in which payment of fees can be deferred until later entry into the workforce. In poor countries like Vietnam, seem reprehensible. Another trend is industry funding for university research. on of corporate confidentiality and intellectual property agreements may hinder autonomy and

impartiality. Today's stream. This may not be preparing us for the integrated and adaptive thinking required to identify and address resource-poor nations such as Singapore have realized that one of their few competitive advantages in the global context and meta-knowledge; that is, in an information age where any required facts are at your fingertips. There has also been a commendable recent trend in the developed world to include current bioscience and from overriding justice in tomorrow's increasingly complex and potential. **ETA-KNOWLEDGE, ADAPTIVE THINKING, ENLIGHTENMENT THINKING, MEMORY ENHANCEMENT, EMOTIONAL INTELLIGENCE** (IP & MP)  
**EEA** : European Environment Agency.

**EFFECT**: A noun, an 'effect' is a result, consequence or impact resulting from some cause. You create an effect by affecting something. (See **AFFECT, CAUSATION, EFFECTIVENESS**) (MP)

**EFFECTIVENESS**: 'Effectiveness', or 'efficacy', is a not just financial but in an overall integrated and sustainable way. The most economically 'efficient' process may not prove to be the most effective. (See **EFFICIENCY**) (MP)

**EFFICACY**: See **EFFECTIVENESS**.

**EFFICIENCY**: 1. Mechanics: a measure of the ratio of work done to energy supplied. 2. Economics: The same concept applied to money; the ratio of value of output to value of input. Productive efficiency is the least-cost set of technologically sufficient inputs, and allocative efficiency is putting scarce resources to the most useful purposes. Different interpretations have included the straightforward economic efficiency of Adam Smith, the social employment efficiency of John Maynard Keynes, and the adaptive efficiency of Joseph Schumpeter with investment in technology and creativity. Clearly there are many forms of efficiency, others relating to the rights of workers, environment, corporate behavior, and efficiency towards sustainable development and social values. All forms of efficiency must be considered to provide balance in economic policy. Efficiency is not necessarily the same as effectiveness - depending on whether the balance of focus is on the 'efficiency' or the 'equity' component of economics. (See **EFFECTIVENESS, EQUITY**) (MP)

**EGALITARIAN**: A social philosophy that advocates human equality. (DM)

**EGG**: See **OVUM**.

**EGG DONATION**: See **DONOR GAMETES**.

**EGYPTIAN BOOK OF THE DEAD**: See **BOOK OF THE DEAD**

**EIA** See **ENVIRONMENTAL IMPACT ASSESSMENT**.

**EIGHTFOLD PATH** : Ethical teachings of Buddha, describing the virtuous path from worldly suffering towards nirvana: 1. ethically correct viewpoint (e.g. selfless, desireless, compassionate), 2. right resolutions, 3. right speech, 4. right action, 5. right livelihood, 6. right effort, 7. proper mindfulness, and 8. regular practice of concentration/meditation. (See **FOUR NOBLE TRUTHS, MIDDLE WAY, BUDDHISM, BUDDHA**) (MP)

**EINSTEIN, ALBERT** : (1879-1955). German-Swiss mathematician/physicist and originator of the theory of relativity. Einstein's insight pointed out that time and space are not absolute but merely relative to the observer and that in the case of rapid relative motion involving velocities approaching the speed of light, phenomena such as decrease in size and mass are to be expected. His predicted equivalence of mass (m) and energy (E) is stated in the equation  $E = mc^2$ , where c is the velocity of light. This relationship was strikingly demonstrated in the

production of nuclear power and the explosion of the atom bomb. Einstein's seminal works were '*The Basis of the General Theory of Relativity*' 1916 and '*On the Special and the General Theory of Relativity*' 1921 the same year that he received the Nobel Prize in physics. Einstein ranks with Galileo and Newton as one of the greatest conceptual thinkers and revisers of human understanding of the Universe. From the 1930s Einstein became increasingly outspoken in support of world peace and towards the end of his life he devoted himself completely to the establishment of a world government and to the eradication of warfare. One of his last acts was to sign a plea for the renunciation of nuclear weapons. (See ATOM BOMB; CLASSICAL MECHANICS; NEWTON, ISAAC; QUANTUM THEORY, PLANCK, MAX). (IP)

**EIS:** See ENVIRONMENTAL IMPACT STATEMENT

**EISAI:** (1141-1215) Japanese Buddhist monk and scholar. Eisai travelled to China to study Buddhism, and returned to Japan to found Zen Buddhism. In addition, Eisai introduced tea to Japan, and wrote about its health benefits. A major Japanese pharmaceutical company is also named Eisai. (AG, DM)

**EKISTICS:** (Greek: *oikō* 'to settle down') The study ofropolis. (See METROPOLIS, ECUMENOPOLIS, SUSTAINABLE CITY) (MP)

**EL NINO-SOUTHERN OSCILLATION PHENOMENON or ENSOP** refers to the warm ocean current that blows along the northern tropical coast of South America in its changing phase causing unseasonable changing weather patterns in the Americas and Pacific Region, including Australia. *El Nino* refers to "the child" of change as opposed to *La Nina* "the Child" of constancy. Great interest has been expressed in the phenomenon and whether its current greater frequency is linked to global warming and human increases in atmospheric carbon dioxide. One model postulates such a relationship in which trapped heat in the CO<sub>2</sub>-rich atmosphere increases the temperature of the oceans, triggering cycles of drought and rain. The local effects of the *El Nino* current were known to the ancient people of Peru long before the arrival of the Spanish conquistadores (see SOUTHERN OSCILLATION INDEX & *LA NINA* -SOUTHERN OSCILLATION PHENOMENON). (IP)

**ELDER ABUSE :** The physical, psychological or material abuse of older adults. Elder abuse, also called '*abuse of the elderly*' violates the rights and safety of the abused person and is a reportable offense. (See ABUSE, CHILD ABUSE, DRUG ABUSE). (IP).

**ELECTIONS ONLINE:** See DEMOCRACY, INTERNET.

**ELECTROCONVULSIVE THERAPY (ECT):** applying a voltage with surface electrodes across the brain under general anesthesia or muscle-relaxants to prevent muscular convulsions, which can be hazardous. In general, electrical therapy is a valuable medical procedure used by both the radiologist and the psychiatrist, and it can be an important intervention prior to starting stabilizing drug treatment. Cardiologists call their procedures "*Cardioversion and Defibrillation*"; psychiatrists call theirs "*Electroconvulsive Therapy or ECT*" but the two emergency procedures are similar in principle and practice. For example, when the heart muscle beats so fast that it is merely shivering, the heart is said to be fibrillating - a state of increased excitability where the blood ceases to circulate in the body. In this situation a pulse of electricity passing through the heart muscle discharges its electrical potential which stabilized and resets the conducting system of the heart until the muscle begins once more its rhythmic beat. In a mental state of extreme agitation the brain's information too fails to flow in logical patterns; thus, a controlled electrical pulse passing across the frontal-temporal region of the brain, began in the 1930s as a treatment for severe schizophrenia

following the observation that patients with schizophrenia and suffering spontaneous seizure used as a convenient and quick treatment for manic depression and melancholia. In the United States of America, for example, approximately 80% that 90% of these will show a marked improvement - a significantly higher figure than that from those treated with antidepressant medication. Desputation (described as a barbaric intrusion in Ken Kesey's book *One Flew Over the Cuckoo's Nest* which was written before the use of anesthesia). However, scientific criticism of its extensive use is justified because convulsive therapy in inexperienced hands may produce permanent brain damage, especially losses of memory and intelligence. Nowadays, the pulse of electricity in its passage through the brain is monitored by an electroencephalograph, a machine which measures brain-wave activity from electrodes placed on the scalp (see COGNITIVE-BEHAVIORAL THERAPY, LEUKOTOMY). (IP)

**ELECTROMAGNETIC RADIATION** is the Sun's ultimate s radiant, anging fromare harnessing this absolute source of energy in original and creative ways. (IP)

**ELECTROPHORESIS:** A method of separating large molecules (such as DNA fragments or proteins) from a mixture of similar molecules. An electric current is passed through a medium containing the mixture, and each kind of molecule travels through the medium at a different rate, depending on its electrical charge and size. Separation is based on these differences. (DM)

**ELEMENT:** 1. Elements are the building blocks of chemistry. Elements are the simplest components of molecules that can be produced by normal chemical means. The nucleus of every atom in an element has the same number of protons. Each chemical element contains different atoms to the other elements, and gives off an individual line spectrum. The Periodic Table arranges all of the elements according to their properties. The hundred or so elements combine to create thousands of compounds with the different physical properties that make up the world. (See ATOM, ISOTOPE)

2. An element more generally refers to any single component or constituent part of a group, object, system or procedure. (See COMPONENT) (MP, RW)

**ELSI :** Ethical, Legal and Social Issues/implications that arise due to the current advancement in science and technology and in the history of science. A few areas where such ELSIs are faced include the human genome with regard to human diseases genes, genetic testing and screening of humans beings as well as in inter-species transfer of genes from unrelated organisms and human cloning. (JA)

**EMAIL:** (Electronic + mail) The term electronic mail understandably shortened itself to E-mail, e-mail and now email as it became an everyday process. Email is a cheap, fast text message delivered electronically over the Internet. Variations on a theme include attachment of files, the group mailing list (mail sent to group), and the electronic bulletin board (group comes to mail). (See WEB ADDRESS, NETIQUETTE, EMOTICON) (MP)

**EMBL :** European Molecular Biology Laboratory in Germany. Is famous for a DNA sequence database. (See BIOINFORMATICS). (JA)

**EMBRYO:** A developing organism in an egg, seed or uterus of its mother. It includes any developing organism before birth, that is derived by fertilization, parthenogenesis, cloning or any other means from one or more human gametes or human diploid cells. Somatic formation of embryo like structures on top of the callus can be grown which can lead to cloned plants from full grown (plant) flower meristem. In human,



early or preimplantation embryo refers to the first two weeks after the formation of the zygote. Embryo technically refers to the stage from the third to eighth week of development. Often the term embryo also encompasses development from the beginning up to the eighth week. A specially created embryo can be made by human technology from donor sperm and ovum, under laboratory conditions for research purposes (IVF technology). At times the US government has disallowed funding for embryo research due to ethically and morally contested questions. Source of human embryos include: 1. Elective abortion 2. IVF technology through donor sperm and oocyte of unrelated persons 3. Left over embryos in infertility treatment by couples 4. Cloned embryos. (See FETUS, PRE-EMBRYO). (DM, JA)

**EMBRYO DONATION:** The transfer from one woman to another of an embryo obtained by artificial insemination and lavage or, more commonly, by IVF.

**EMBRYO EXPERIMENT:** Why do scientists and doctors carry out experiments on early human embryos? There many aspects to this question but it's important to understand that research and advances in medicine are inseparable. Without research on embryos, for example, the Assisted Reproductive Technologies (ART) would never have been developed and countless infertile couples would not have been helped by modern IVF technology. However, ART procedures are not perfect and to improve their efficacy, further research is required. The area of genetic defects which amount to 2-5% of all births and about half of infant mortality, is another example where responsible embryo research would improve existing understanding of the mechanisms involved in normal and abnormal development. (See DEVELOPMENT; DEVELOPMENTAL ANOMALY; TERATOLOGY). (IP)

**EMBRYO LAVAGE:** A flushing of the uterus to recover a preimplantation embryo.

**EMBRYO TRANSFER :** Transfer of a human embryo into a uterus following in vitro or in vivo fertilization. (DM)

**EMBRYOLOGY** the study of the origin, growth, development and function of an organism from fertilization to birth (Greek *bryein* to grow + *logos* science). (IP)

**EMBRYONIC GERM CELLS (EG) :** Similar in function to Stem cells, derived from the primordial reproductive cells of the developing fetus. (See STEM CELLS). (JA)

**EMBRYONIC PERIOD :** Comprises the first 8 weeks of prenatal life where organogenesis takes place. Organogenesis is the most complex stage of development and is characterized by the formation of all organs and organ systems of the embryonic body. Each organ or organ system has a particular time during pregnancy when it is being formed called the critical period. During the critical period of intrauterine development the embryo or fetus has the greatest sensitivity to environmental influences. Striking advances during the third week is the development of somites, the heart, the neural folds and the major divisions of the brain, the neural crest, and the beginnings of the internal ear and the eye (see also FETOGENIC PERIOD, EMBRYO, FETUS). (IP)

**EMBRYONIC STAGE (INTEGRATE!) :** A stage in human development between 15 days and 8 weeks post-conception of pregnancy. In the absence of more precise information (i.e. menstrual cycle length) conception is presumed to have taken place two weeks after the beginning of the women's last menstrual period. The distinction of the can not yet be defined as contributing to the es have been laid down and there is a general appearance of a mammal-to-be with four limbs and a head. (JA)

**EMBRYONIC STEM CELLS :** (Anglo-Saxon *stemm* tree or trunk & Latin *cella* storeroom). A formative cell whose daughter cells give rise to other cell types; for example, pluripotent embryonic stem cells are capable of generating all cell types compared to the multipotent adult-derived stem cells which generate many but not all cell types. Thus, stem cells may originate from embryonic tissue and from adult tissue and both types are suitable for cloning technology; that is, therapeutic and/or reproductive. Therapeutic cloning is the cloning of embryos containing DNA from an individual's own cell to generate a source of embryonic stem cell-progenitor cells that can differentiate into the different cell types of the body. The aim is to produce healthy replacement tissue that would be readily available and due to immunocompatibility, the recipients would not have to take immunosuppressant drugs for the rest of their lives. The ethical status of embryonic stem cells is a matter of controversy because the label 'embryo' is asyo. Folls arts against cloning maintain that by virtue of the pre-embryo's special status, it's wrong to carry out destructive experiments on them. (See STEM CELL). (IP)

**EMBRYONIC STEM CELL LINE:** cultured cells obtained by isolation of inner cell mass cells from blastocysts or by isolation of primordial germ cells from a foetus. Embryonic stem cells will not give rise to an embryo if placed in the uterus. (JA)

**EMBRYO TRANSFER** is the procedure of transferring an *in vitro* fertilized conceptus into the uterus. The embryos to be transferred are loaded into a fine plastic tube which under ultrasound guidance is introduced via the cervix into the uterus and is, in most clinics, done without anesthesia (see Assisted Reproductive Technologies). (IP)

**EMERGENCE:** The appearance of simple large-scale behavior from complexity. Collective behavior is by its nature unpredictable, arising as it does from a complex system of rules and complicated network of subsystems all undergoing change. Emergence is the surfacing of order, from a sea of fluctuations, at a certain scale or level of organization. (See EMERGENT PROPERTIES, SIMPLEXITY, COMPLICITY) (MP)

**EMERGENT PROPERTIES:** The global properties and behavior of whole systems. Complex systems consist of many interacting subunits which combine to create emergent properties. The inability of reductionism to predict collective behavior is neatly encapsulated by ‘the whole is more than the sum of its parts’. Whether or not technically true, the intepossible by collectivity and organization - include economic fluctuations, social order, life, intelligence and consciousness. (See EMERGENCE, COMPLEXITY THEORY, SYSTEMS THEORY) (MP)

**EMERGING PARADIGM:** See ALTERNATIVE PARADIGM

**EMOTICON:** ('Emotion' + 'icon') A text-based icon which communicates an emotion, commonly used as a cute form of netiquette in e-mails. For example:

smiley-face :-D wink ;-D laugh :-D frown :-( crying :-(  
shock :-O say nothing :-X greedy \$-) angel 0:-) devil }:-)

some upright versions, mostly of Japanese origin such as:

glowing smile    \*^ ^\*    blush    @^ ^@

and many others. ☺☐= (See NETIQUETTE) (MP)

**EMOTION:** Emotion is the transient psychological, physiological and behavioral response to thoughts, events and social activity. A typical classification of emotions might be the following primary families: anger/annoyance; fear/anxiety; sadness/loneliness; disgust/shame; surprise/shock; pleasure/joy; love/friendship. These feelings arise from neural excitement triggered by perception, cognition or memory. The emotional brain is the limbic system, including its functional compartments: thalamus, hypothalamus, hippocampus, amygdala and pituitary gland. Emotional intelligence is self-awareness and management of one's own emotions. (EMOTIVISM, MOOD, LIMBIC SYSTEM, AMYGDALA, ANGER, FEAR, PLEASURE, JOY, LOVE) (IP & MP)

**EMOTIONAL INTELLIGENCE:** A term emphasizing the range of different types of intelligence and the role that emotions play in effective communication and decision making. Emotional intelligence, as Daniel Goleman articulates in his book of the same name, is the most crucial factor in relationship and career success and involves awareness of the appropriateness of emotions we and others use as a guide to our thinking and behaviour. Components of emotional intelligence include the following abilities: self-awareness of one's emotions and their significance, management of one's emotions, awareness of the emotions of others, emotional both thought and feeling in decision-making, stress management and effective relationships, conflict resolution, cooperation and communication. (see EMOTIONS, EMPATHY, ALEXITHYMIA) (MP)

**EMOTIONAL INTELLIGENCE QUOTIENT (EQ):** E.Q. ('Emotional intelligence Quotient' or 'Emotional Quotient') is an adaptation of the more commonly known test measure I.Q. ('Intelligence Quotient'), emphasizing characteristics of emotional intelligence such as ability to read the emotions of others and control one's own emotions accordingly. (See EMOTIONAL INTELLIGENCE) (MP)

**EMOTIONS, EMOTIVISM :** Sometimes emotions are thought of as a better guide to truth and goodness than is the intellect. David Hume (q.v.) said that "the intellect is and ought to be slave of the passions and can pretend to no other office than to serve and obey them." He also argued that ethical statements are really only expressions of how we feel about things. The ethical philosophy of emotivism is one of Hume's heirs. Although it can be debated whether intellect or emotion is a surer guide to truth, they might both be equally determined by education and cultural conditioning. (FL)

**EMPATHY:** (Greek: *empathia* 'affection' or 'feeling into') Empathy refers to an ability to imagine or perceive the emotions or experience of another person. The word was first used in reference to physical or motor mimicry. It requires an emotive psychological identification with another's feelings and identity. Psychopaths and sociopaths may lack the empathy to make this emotional connection. Empathy is the root of compassion. (See SYMPATHY, COMPASSION) (MP)

**EMPIRICAL:** Derived from observation, experience or experiment rather than from conjecture, hypothesis or theory. Empirical information is based on perception with the five senses rather than thinking and rationalism. (See EMPIRICISM) (MP)

**EMPIRICISM:** A view or philosophy of knowledge which considers sensory experience to be the primary source of information. Locke, Berkeley and Hume are among the British Empiricists, Kant, James and Wittgenstein continued the discussion, and the logical positivists (linguistic empiricism) include A.J. Ayer, Rudolph Carnap, C.W. Morris, Ernest Nagel and Moritz Schlick. (See EMPIRICAL) (MP)

**EMPHYSEMA** : A lung disease, genetic defect due to lack of a protein, alpha-1-antitrypsin (AAT). (JA)

**EMPOWERMENT**: The provision of power, usually to those seemingly without means of self-protection or control over changes affecting their life. This may include increasing the awareness of indigenous people or minority groups. Without the benefit of an outside perspective it is often difficult to understand the larger-scale system, corporate/government motivations, or avenues of protest, media coverage and/or legal recourse. (See CAPACITY BUILDING, MINORITY GROUPS) (MP)

**ENCEPHALIZATION QUOTIENT**: Comparative indicator of brain size in relation to body size - for example a species with EQ=1 has an average sized brain for its body size, EQ=2 refers to twice average, dolphins are said to have an EQ of about 5 and humans an EQ of around 7. (MP)

**ENDEMIC SPECIES**: A species that is specific in its occurrence in a particular geographical area. Like the Kangaroo of Australia. (JA)

**ENDANGERED SPECIES**: A species which is at very high risk of becoming extinct in the wild in the near future. This may be indicated by any of the following measures: a) a previous or projected population reduction of at least 50% over whichever is longer of a period of 10 years or three generations, b) extent of occurrence less than 5000 km<sup>2</sup> or area of occupancy less than 500 km<sup>2</sup>, along with population decline, fragmentation or extreme fluctuations, c) population less than 2500 mature individuals with continuing decline, d) population less than 250 mature individuals, or e) probability of extinction in the wild estimated at 20% over the longer of 20 years or five generations (**IUCN Red List Categories 1994**). (See CRITICALLY ENDANGERED, VULNERABLE SPECIES, THREATENED SPECIES, GHOST SPECIES, EXTINCTION) (MP)

**ENDOCRINE DISRUPTORS** : See SYNTHETIC HORMONE DISRUPTORS.

**ENDOCRINE SYSTEM**: Refers to the body's hormone system released into the ls of only parts per trillion, our bodies strictly control their blood concentrations [Greek *endon* within + *krinein* to separate]. (IP)

**ENDOCRINOLOGY** the study of hormones and their actions (see ENDOCRINE SYSTEM).

**ENDOGENOUS**: Developing or originating within the organism, or arising from causes within the organism. (DM)

**ENDOGENOUS DEPRESSION**: Depression arising from within the mind of the individual rather than as a result of external (exogenous) factors or life circumstances. This reflects a genetic predisposition to the disorder, usually involving a physiological imbalance in brain neurotransmitters. Often this results in recurring depressive episodes or chronic major depression, however a predisposition to its expression is not a foregone conclusion with the right lifestyle and environment. Endogenous depression may be managed, with preferably minimal pharmacological treatment, strong social support and a positive, resilient attitude. (See DEPRESSION) (MP)

**ENDOMORPH** : A person with an extreme body type typified by rounded frame, soft body and plump features such as abdomen larger than thorax. People with a high degree of endomorphy may suffer from difficulty shedding weight, perhaps poor self-image, and increased risk of conditions related to obesity such as heart disease. (See ECTOMORPH, MESOMORPH, OBESITY) (MP)

**ENDOTOXIN**: Poison produced by some gram-negative bacteria, present in the cellular membrane, and released only upon cell rupture; composed of complex lipopolysaccharide (fat-like molecule and sugar molecule) and more heat-stable than protein exotoxins. (DM)

**ENDPOINTS** : See ESCHATOLOGY.

**ENDRIN** : A dangerous chlorinated hydrocarbon pesticide, among the 'dirty dozen' persistent organic pollutants. (See PERSISTENT ORGANIC POLLUTANTS) (MP)

**ENERGY**: 1. A fundamental constituent of matter ( $E=mc^2$ ). 2. The capacity to do work 3. Kinetic energy (mechanical), potential energy (gravitational), electrical energy, chemical energy (molecular, nuclear), radiant energy (light, electromagnetic radiation) and heat energy. 4. The capacity to cause change in a system; origin of processes, system dynamics. 5. Energy sources: oil, coal, natural gas, ethanol, wind, water, biomass, chemistry, geothermal, nuclear, and the primary energy source for living systems on Earth, the sun. 6. Energy utilization and technologies: e.g. nuclear fission/fusion, renewable energy technologies, alternative/soft energy, energy efficiency. (See MOMENTUM, ENTROPY, WORK, MATTER, PROCESS, HEATING, ELECTROMAGNETIC RADIATION, SOFT ENERGY, RENEWABLE ENERGY TECHNOLOGIES) (MP)

**ENERGY BALANCE**: See GLOBAL ENERGY BALANCE.

**ENERGY CONSERVATION** : See LAW OF CONSERVATION OF ENERGY.

**ENGINEER**: (Old French: *engignier* "to contrive", from Latin: *ingenium* "talent") The engineer uses materials and processes in the invention, design, planning and construction of systems, products and infrastructure. To engineer is also to originate or cleverly plan an outcome. For the engineer, difficult technical problems must be identified and choices made for the deployment of applied solutions in the face of social and ecological risk and uncertainty. (See ENGINEERING, ENGINEERING ETHICS) (MP)

**ENGINEERING**: Engineering is the vehicle for the realization of technology. Using information generated from science, engineering oversees the transformation of raw materials into technology. The engineering profession is commonly divided into mechanical, civil, electrical, chemical, aeronautical and military engineering. Such purview indicates the ethical responsibility implicit in this sector and its control over the course of development and change. (See ENGINEER, ENGINEERING ETHICS) (MP)

**ENGINEERING ETHICS**: Engineers solve problems and build infrastructure within a set of physical, environmental, economic and design constraints. Among those constraints is an ethical duty of care to social and environmental needs. Human and environmental wellbeing are the driving forces rather than individual or commercial desire. Social and ecological requirements are introduced into engineering through regulatory methods like the precautionary principle and environmental impact assessment, and through ethical codes of conduct. Examples of engineering codes of ethics include those of the World Federation of Engineering Organizations, the Institute of Electrical and Electronics Engineers (US) and the Institution of Engineers (Australia). These may include references to fairness, accountability, environmental principles, public protection, and not allowing client interests to compromise community goals. (See ENGINEER, ENGINEERING) (MP)

**ENHANCED-RADIATION WEAPON** : See NEUTRON BOMB.

**ENLIGHTENMENT** 1. an intellectual movement in Europe from the 16<sup>th</sup> to the 18<sup>th</sup> Centuries that believed in the power of human reason to understand the world and to guide human conduct 2. for Buddhists the state of enlightenment or 'nirvana' as the goal of human existence. (IP)

**Enlightenment Thinking**: (See MULTIDISCIPLINARY, INTEGRATED MANAGEMENT, HOLISTIC)

**ENOCK** : See BOOK OF ENOCK.

**ENSO** : See *EL NINO* -SOUTHERN OSCILLATION PHENOMENON

**ENTREPRENEURSHIP** : Investment by health professionals or researchers in a profit-making business or enterprise related to their work (See CONFLICT OF INTEREST). (DM)

**ENTROPY**: A measure of the disorder or randomness in a system. The second law of thermodynamics states that entropy of a closed system always increases over time. This means that energy is being transformed by the mechanics of the universe into uniformly-distributed heat energy. However, this is true only for large closed systems, and order can be maintained in an open system containing life. (See ENERGY) (MP)

**ENVIRONMENT**: The sum total of all that surrounds an organism, both biological environment and physio-chemical environment. (JA)

**ENVIRONMENTAL COMPENSATION**: Environmental compensation is a trade-off of beneficial environmental outcomes to compensate for the damage or adverse impacts of development, thus maintaining the aggregate natural 'stock'. Desoals ng industries by establishing programs of tree-planting or trading of 'carbon credits'. (See ENVIRONMENTAL SUBSTITUTION, CARBON CREDITS, BIOREMEDIATION, TREE-PLANTING, RESTORATION ECOLOGY) (MP)

**ENVIRONMENTAL DEFENSE FUND**: A commendable US coalition of environmental lawyers who forego lucrative careers to rely on public donations in the fight against destructive corporate practices and the support of environmental values in the legal system. (MP)

**ENVIRONMENTAL ETHICS** : The ethical issues relating to environment. May take anthropocentric, biocentric or ecocentric approaches. Bioethics is a term including both environmental ethics and medical ethics issues. (See BIOETHICS, ENVIRONMENT). (DM)

**ENVIRONMENTAL FLOWS**: Movements through compartments of the environment, a model or process. Environmental flows include abiotic solids (e.g. minerals, topsoil), biotic flows (e.g. harvest biomass), ecological flows (e.g. migration), genetic exchange (e.g. crop genetics), water (surface water, ocean currents), air (atmospheric gases), biogeochemical cycles (e.g. carbon, nitrogen cycles), product cycles (extraction, production, transport) and pollution (waste, heat, radioactive materials etc). (See MATERIAL FLOWS, ENVIRONMENTAL PROCESSES, ENVIRONMENTAL SYSTEMS, LIFE CYCLE ASSESSMENT) (MP)

**ENVIRONMENTAL GRADIENT**: A gradual change in certain environmental conditions. Examples include geographical gradients of climate, soil or vegetation, or abundance/productivity gradients graphed against climate or soil type. Environmental gradients determine the optimal range and distribution of species with different requirements. (See STENOTYPIC SPECIES, EURYTYPIC SPECIES, GRADUALISM) (MP)

**Environmental Health** : Describes circumstances that ensure that living organisms (plants, animals and microorganisms) are provided with the best chance to reach and maintain their full genetic potential. For example, it is well known that children exposed to harmful agents; such as lead or alcohol, during critical periods in their development, are deprived from reaching their full genetic potential. Obviously the maintenance of overall environmental health is a balancing act between conflicting needs; however, since humans are now 'in charge' of

planetary health, we have an ethical duty to do or best in maintaining as fully as possible the genetic potential of all living things. (See WELLBEING; HEALTH; ENVIRONMENTAL ETHICS). (SG2+IP)

**ENVIRONMENTAL IMPACT:** An environmental impact may be adverse, beneficial or a combination of these, although use of the term often connotes a negative impact. It may be sudden (e.g. land clearing), gradual (e.g. water utilization) or have delayed action (e.g. climate change). Impacts may create secondary or flow-on impacts, and may add or multiply in combination with other impacts. It may be an environmental impact on humans (e.g. natural hazards) or a human impact on the environment (mining, dams, pollution etc). Usually refers to adverse impacts of human activities and developments on natural systems and ecology (e.g. environmental impact assessment), or also on the broader environment including human society (e.g. social impact assessment). Attempts have been made to estimate the total environmental impact of human activity on the Earth; for example,

- a) *Total impact = PF (Population x impact per capita)*
- b) *Ecological impact = PCT (Population x Consumption/affluence x Technological efficiency)*
- c) *Impact damage = population x economic intensity x resource intensity x environmental pressure on the resource x susceptibility of the environment*
- d) *Impact = PLOT (Population x Lifestyle x Organization x Technology).*

Risk evaluation and prevention of environmental impacts is essential to avoid further breakdown of the Earth's ecosystem support processes, critical natural capital and quality of life. (See IMPACT, ENVIRONMENTAL IMPACT REPORT) (MP)

**ENVIRONMENTAL IMPACT STATEMENT (EIS):** The final document prepared for the Environmental Impact Assessment, outlining the environmental consequences and recommended alternatives or mitigation measures. (See Environmental Impact Assessment) (MP)

**ENVIRONMENTAL INFORMATION DIRECTORIES:** The proliferation of data collected in recent decades has necessitated information networks and metadata directories to simplify the storage and distribution of environmental information. A few examples include online scientific journals and State of the Environment Reports, national Bureaus of Statistics, United Nations Statistical Division (UNSTAT), Sustainability Web Ring, Center for International Earth Science Information Network (CIESIN), American Library Association Task Force on the Environment, Environmental Resources Information Network (Australia), National Directory of Australian Resources (National Resource Information Centre), World Resources Institute, World Meteorological Organization, Global Change Research Program (US Govt.) and Global Change Master Directory (NASA). (See BIOETHICS INFORMATION DIRECTORIES, MEDICAL INFORMATION DIRECTORIES) (MP)  
*(feel free to add any other major examples)*

**ENVIRONMENTALISM :** The movement concerned with slowing or reversing environmental degradation caused by human activities. (RW)

**ENVIRONMENTAL AUDITING:** (See ENVIRONMENTAL MONITORING, ENVIRON. IMPACT ASSESS)

**ENVIRONMENTAL CODE OF CONDUCT:** The integration of an ethical dimension into considerations affecting the environment. This may involve the formulation of new rights, responsibilities and obligations, such as rights of access to environmental information, consultation



in environmental decision making, environmental impact assessment, and environmental policy-making which ensures a sustainable quality of life on Earth. (See ENVIRONMENTAL IMPACT ASSESSMENT) (MP+IP)

**ENVIRONMENTAL CONSULTING:** See CORPORATE ACCOUNTABILITY, ENVIRON. IMPACT ASSESS.

**ENVIRONMENTAL EDUCATION:** Environmental education is to teach the facts about the environment. It can teach people our relationship to other parts of nature. Environmental ethics education is more. It is to teach how to incorporate the facts and values of different organisms into ethical decision-making. Environmental ethics education teaches how we should live, whereas environmental education is linguistically descriptive, how we do live. However, much of environmental education is actually also teaching some values. But without teaching how to balance all interests, and facts and values, it can be propaganda. (DM)

**ENVIRONMENTAL ETHICS:** Ethical issues associated with the environment. Can refer to both living and non-living parts of the environment. Part of Bioethics. (See BIOETHICS). (DM)

**ENVIRONMENTAL IMPACT ASSESSMENT :** CI; project like building a high rise dam/a fertilizer chemical plant, it provides useful information for helps decision. Components include: Project concept, pre-feasibility studies, fessibility, design and engineering, implementation, monitoring and evaluation. Principles includeevolving the appropriate experts and groups, linking of information obtained with decisions about the proposed projects, presentation of cleaound environmental management. And provision of information in a executive statement for the decision makers.Participants include the develotaff, competent and government authority, local community and politicians. Scope: 1. What will happen as a result of implementing the propos social changes Do the changes matter much? What can be done about them in terms of remedy? How can the decision-makers be informed of what completing the EIA study. (JA)

**ENVIRONMENTAL INDICATORS:** Physical, chemical, biological, social and economic characteristics of the environment which are monitored as indicators of broader environmental health and integrity. They provide comparisons with standard references, between regions, and of course across time. Environmental indicators create meaning, simplify data and streamline management by reducing the number of measures needed for exact representation of the environmental situation. They represent key states or processes within a well-developed interpretive framework such as Environmental Impact Assessment, Pressure/State/Response models and State of the Environment reporting. As examples, indicators of pressures may include vegetation clearance/fragmentation, indicators of environmental state may include distributions/abundances of species, and indicators of response might include the proportions of protected area by ecosystem type. Environmental indicators may include pre-existing managerial, commercial or census data. Implicit in the choice of a key set of indicators are simplifications, assumptions and value judgments. Care must be taken that they cover all fundamental issues and are appropriately scaled, broadly representative, robust, comparable, credible, and easily monitored. (See INDICATOR SPECIES, PRESSURE/STATE/RESPONSE MODEL, ENVIRONMENTAL MONITORING, ENVIRONMENTAL AUDITING, ADAPTIVE MANAGEMENT) (MP)

**ENVIRONMENTAL MONITORING:** A process of repeated collection of data from a number of environmental indicators according to schedules across time and space. These are essential for awareness of environmental change and the impacts of policy and development. Choice of measurement parameters is determined by broader frameworks investigating different postulates and processes. Measurement is the authority of science, and neither adaptive management nor credible sustainable development can occur without monitoring. One criticism of

the Environmental Impact Statement is its inability to illustrate change, without monitoring we only have static baseline observation. Regularly-used environmental indicators include water quality, species abundance and habitat distribution, but standardized data is also collected by remote sensing and collated by census and State of the Environment reporting. (See ENVIRONMENTAL INDICATORS, BASELINE MONITORING, ADAPTIVE MANAGEMENT, ENVIRONMENTAL AUDITING, ENVIRONMENTAL IMPACT ASSESSMENT, STATE OF THE ENVIRONMENT REPORT, REMOTE SENSING) (MP)

**ENVIRONMENTAL PROCESSES:** Environmental processes are the functions, forces and dynamics which drive change in environmental systems. Although systems may be diverse and complex, fundamental processes acting upon them are more limited in number and therefore easier to model and manage. Examples of micro-scale environmental processes (with examples of broader application) include the following: chemical transformation and precipitation (e.g. pollution chemistry), biochemical transformation (e.g. metabolic pathways), ion exchange (cellular transfer), genetic exchange (modified crops/ecosystems), adsorption, absorption (biochemical oxygen demand), acid/base reactions (acid rain), sterilization (disinfection), filtration (water quality), coagulation, membrane separations, oxidization/reduction, volatilization (air quality), thermal transformations, phase transfer and mass transfer processes among other transport and transformation processes. The 'environmental processes' category is only one sS, ENVIRONMENTAL FLOWS, PRESSURE/STATE/RESPONSE MODEL) (MP)

**ENVIRONMENTAL RESOURCE ECONOMICS :** Refers to economic management which goes beyond the conventional supply/demand relationships and monetary values by including other economic aspects of resource usage. Some of these additional aspects include pollution, general environmental degradation, effects on existing life-support systems, and other broadly-based environmentally connected economic concerns. Many aspects of resource utilization consist of intangibles such as culture, knowledge, beauty, ethical insights and general satisfaction with life. These intangibles need to be considered when allocating value to resource development. (IP)

**ENVIRONMENTAL SUBSTITUTION:** The exchange of one type of resource for another, the usual example being the transition from ecological resources to technological substitutes, usually not until the resource is damaged or depleted. A better proposition is substitution which replaces human economic capital with enhanced natural capital and a stronger environment. Strong sustainability does not allow environmental substitution, and even weak sustainability does not allow substitution of critical natural capital. (See STRONG SUSTAINABILITY, CONSTANT CAPITAL, CRITICAL NATURAL CAPITAL, ENVIRONMENTAL COMPENSATION) (MP)

**ENVIRONMENTALLY SUSTAINABLE DEVELOPMENT:** Sustainable Development with an emphasis on the integrative inclusion of the whole environment, (not over-emphasizing ecological or economic aspects). (See SUSTAINABLE DEVELOPMENT, ECOLOGICALLY SUSTAINABLE DEVELOPMENT) (MP)

**ENVIRONMENTAL SYSTEMS:** Environmental systems may be biological, ecological, chemical, physical, socio-economic or managerial. Systems may be natural (e.g. ecosystems), engineered (e.g. urban environment) or artificial (e.g. cyberspace). (See SYSTEM, ECOSYSTEM, ENVIRONMENTAL PROCESSES, ENVIRONMENTAL FLOWS, PRESSURE/STATE/RESPONSE MODEL, SYSTEMS THEORY, COMPLEXITY THEORY) (MP)

**ENVIRONMENTAL VALUATION:** (See ECOLOGICAL ECONOMICS, INTRINSIC VALUE, USE VALUE)

**ENZYME:** A protein that acts as a catalyst, speeding the rate at which a biochemical reaction proceeds by not altering its direction or nature. Also some RNA can act as an enzyme, a ribozyme. Enzymes regulate chemical reactions in cell of an organisms - Most names of enzymes usually end with "ase" eg. Protease. Amylase Exceptions - like Trypsin. (DM, JA)

**EPA :** Environmental Protection Agency of the USA.

**EPC :** See EUROPEAN PATENT CONVENTION.

**EPIDEMIOLOGY:** The science of disease incidence and patterns of disease spread and distribution, including disease control and prevention. The study ("ology") of diseases or other phenomena over ("epi") a population ("demos"). The word derives from a book of that name by Hippocrates. Modern epidemiology makes .extensive use of advanced computerized statistical methods. Epidemiology is a powerful tool in evidence-based medicine. But there are always exceptions to every rule. Some few people are sedentary, heavy smokers, and eat all the worst foods, but live long, happy lives. So the value of epidemiology remains incomplete. But today researchers are beginning to pay detailed attention to genetic factors which may explain individual differences and exceptions to rules. This may help epidemiology to become an even more powerful tool.

Bioethical restrictions on study of patients' files and tissue samples, for reasons of privacy, hamper the progress of epidemiological research. While ethical restrictions on interventional and prospective research might be made stricter, more attention might be given to liberalizing restrictions on non-interventional, retrospective research, aided by computerized, anonymized, hospital and health ministry files, opening the way for epidemiology to serve public health even more beneficially. (FL) (See GENETIC EPIDEMIOLOGY)

**EPIGENETIC :** Different factors can alter the phenotype without modifying the genotype. Imprinting is considered a form of epigenetic modification of the expression of a given genomic region, since the same DNA rearrangement can lead to different phenotypes, depending of the parental origin of the aberrant chromosome. Methylation of suppressor genes in some forms of tumors can also explain modified phenotypes, where no alteration of the genotype is observed. Sibs sharing a same mutated genotype in autosomal dominant or recessive diseases with complete penetrance, but showing a different phenotype, can also result from epigenetic factors acting on the genotype. (See also EPISTATIC). (GK)

**EPINEPHRINE :** see ADRENALINE.

**EPISOME:** A DNA molecule that may exist either as an integrated part of a chromosomal DNA molecule of the host or as an independently replicating DNA molecule (plasmid) free of the host chromosome. (DM)

**EPISTATIC:** Several genes can act on a genotype in modifying its phenotypic expression. This phenomenon has been described for mendelian disorders with complete penetrance, like Cystic Fibrosis, where the same mutated genotypes can have varying degrees of severity of the clinical symptoms. It is presumed that proteins encoded by other genes can modify the original impairment of the CFTR-encoded ion channel. In the case of this disease, epistatic and epigenetic factors, although not yet characterized, are important issues in genetic counseling. (GK)

**EPISTEMIC:** See EPISTEMOLOGICAL.

**EPISTEMOLOGY:** (Greek: *epistemo* ‘knowledge’) The braf, certainty, doubt, opinion, explanation, interpretation, possibility, skepticism. Sources of knowledge may be sensations, reason, introspection or memory. Epistemology can be considered a ‘theory of knowledge’ or ‘theory of cognition’. Is there an archiettier, Foucault and Pyrrho of Elis. (See KNOWLEDGE, META-KNOWLEDGE, ONTOLOGY) (MP)

Epistemology, or Theory of Knowledge, is the study of how we know, and to what extent we can be sure that our knowledge is true. So epistemology is inseperable from the philosophy and methodology of science. And epistemology of bioethics would be a stu dy of how we can know whether our bioethical opinions are right or wrong. Surely a survey of opinions would not answer the question, because the opinions of a radical reformer might be right, but might be quite unpopular, at least at the beginning. Nor c an be say that we can find out what is bioethically true by looking at religious sources. Although religious sources, like the Bible, might be the inspiration for much deep bioethical thinking, such sources are notoriously unclear about details, and ope n to a variety of interpretations. A good example is the abortion debate within Judaism, where even among the orthodox there is a wide variety of opinions, ranging from the extremely strict to the quite liberal. Since the same sources are available bot h to the strict and to the liberal, we can be sure that the sources do not decide the issue. Utilitarianism (q.v.) was developed by Bentham and Mill as an attempt at an epistemology of ethics. They thought that it would be possible to sit down and calcul a te what act causes the greatest pleasure and the least pain, and is therefore the most ethical.(see the discussion under UTILITARIANISM, ACT AND RULE, in this Dictionary.) Because of the difficulties of developing a scientific method in ethics, emotivis t doctrines (see the discussion under EMOTIONS, EMOTIVISM in this Dictionary) are quite popular. The easiest way to solve the problem is simply to say that words like 'good" and "bad" are simply ways of expressing our feelings about things. So moral sta t ements are neither true nor false, but simply a matter of taste. It is hard to accept this doctrine because it is obvious that statements like "Torturing children is bad" are obviously true. So the search for an epistemology of bioethics is still urgent. ( FL)

**EPISTEMOLOGICAL:** Epistemological (or ‘epistemic’) is an adjective referring to something with relation to knowledge or belief e.g. an epistemological framework may comprise a certain cognitive stance, *Weltanschauung* (‘world-view’) or paradigm. (See EPISTEMOLOGY, KNOWLEDGE, WORLD VIEW, PARADIGM) (MP)

**EPISTEMOLOGICAL UNCERTAINTY:** See UNCERTAINTY

**EPO :** See EUROPEAN PATENT OFFICE/ORGANIZATION.

**EQ:** See EMOTIONAL INTELLIGENCE QUOTIENT and ENCEPHALIZATION QUOTIENT

**EQUAL PROTECTION :** The constitutional or legal guarantee that no person shall be denied the same legal protection enjoyed by others in like circumstances. (DM)

**EQUILIBRIUM:** (See BALANCE) (MP)

**EQUINOX:** Two times in each year when the Sun is vertically overhead at the equator (21<sup>st</sup> March and 22<sup>nd</sup> September), and daylight and night are equally long. (See SOLSTICE) (IP)

**EQUITY:** Fairness or **JUSTICE** (q.v.). Precisely what constitutes fairness and justice is a large question in bioethics. (MR+GK)

**ERGONOMICS:** The relation of humans with machines, in particular the study of body posture in relation to engineering. Ergonomics includes features of chair design, tool design, positioning of dials, room layout and computer interface which correspond to healthy body form. For those at a machine, desk or computer for long hours, an ergonomic chair and workplace are essential for preventing stress, fatigue, neck strain, back injuries, deep-vein thrombosis, sprained muscles and repetitive strain injury (RSI). Good posture and movement, correct distance, stretching, work rotation and ergonomic furniture are all healthy aspects of the workplace. (See REPETITIVE STRAIN INJURY) (MP)

**ERIN:** Environmental Resources Information Network (Australia).

**EROS:** the ancient Greek God of love and sex (known in the west as the winged cherub Cupid). It was believed that Eros participated at the very beginning of creation and from humankind's inception directed and regulated the life and happiness of all. Owing to his multi-faceted characteristics, which effectively recognized the combined elements of love's carnal somatic and psychic dimensions, this God was honored and exalted above any other. It was believed that the communication between the inner psychic and the pros the ideal way of existence in biological terms as it led to the genesis of spiritual goodness and a longing for immortality. (IP)

**ERROR :** (Latin *errare* 'to wonder'). In research the uncertainty in a measurement or estimate of a quantity. Uncertainty should be expressed when a temperature, for example, is readable only to the nearest degree Celsius - this temperature should then be documented as  $20 \pm 0.5$  °C meaning that the true value lies between 1 se from faults/inaccuracies in instruments or changes in conditions can be corrected for. (See ESTIMATE). (IP)

**ERYTHROPOIETIN OR EPO:** is a naturally occurring hormone produced by the kidneys which stimulates the bone marrow to produce more erythrocytes or red blood cells. Synthetic EPO has gained disrepute because of its illegal use by athletes. The theory behind its popularity is that since red blood cells carry oxygen around the body, hormone-driven increases in cell numbers will also lead to increased oxygen availability and better body performance; for instance, an elite cyclist can travel anywhere between 70-75 km/h but with increased oxygen carrying capacity the rider can potentially reach that speed more quickly and hold it for longer periods. Until recently EPO abuse has been difficult to detect because the synthetic form could not be distinguished from the naturally occurring form. However, technology developed by Australian scientists can now identify biological markers which allow drug-testing authorities to identify the synthetic hormone up to four weeks after the last dose. EPO drug testing was first approved for use in the Sydney Olympic Games in October, 2000. (IP)

**ESCHATOLOGY :** (Greek: *eskhatos* 'last') 1. Theology: the branch of religious theory concerned with last things; in particular death, the 'end of the world', and our individual and collective ultimate fate in different religious philosophies. Some traditional 'after-death' circumstances such as divine judgement have been philosophized to occur also on Earth during the lifetime; this is 'realized eschatology'. (See LIFE AFTER DEATH) 2. Science: theoretical physics also contributes towards eschatology, with current cosmological models tending to favor the 'heat death' of the universe over the 'big crunch', depending upon the mass of the mysterious 'dark matter' of the universe. (See BIG CRUNCH, HEAT DEATH, OMEGA POINT THEORY) 3. Strategy and management: the study of logical endpoints and the projection of processes or philosophical models to their ultimate inferred conclusion. Eschatological analysis illuminates the long-term, identifying philosophical directions for problem-solving and decision-making. This can also expose certain ironies inherent in common assumptions about human

behavior - for instance, the eschatology of capitalism without regulation or ethical restraint seems to be a final person/company/country with all the fluid capital and an almost total majority with nothing or next-to-nothing. (See VISION, INTEGRATED MANAGEMENT) (MP)

**ESD:** See ECOLOGICALLY SUSTAINABLE DEVELOPMENT.

**ESOTERIC:** Typically used to mean 'rarefied and so of little relevance' but originally used with reference to philosophical debates to mean 'meant only for the initiated'. In this sense, an esoteric argument could be difficult to understand but have major consequences. (MR)

**ESP:** See EXTRASENSORY PERCEPTION.

**ESPERANTO :** An artificial language designed as a global lingua franca, Esperanto was first published in 1887 by the name 'Lingvo Internacia' by Ludwig Zamenhof under the pseudonym Doktoro Esperanto ('Doctor Hopeful'). Esperanto is based on the European lexicon with Slavonic influences, and has various dedicated international journals, conferences and associations despite limited official status. (See ARTIFICIAL LANGUAGES, LINGUA FRANCA) (MP)

**EST :** See EXPRESSED SEQUENCE TAG.

**ESTIMATE :** A rough calculation made to provide a preliminary answer to a problem indicating what the response may be if a variable is changed. (See ERROR). (IP)

**ESTUARY:** Semi-enclosed coastal waters at the junctions of rivers with ocean habitats, for example littoral basins, bays, inlets and harbours. Estuaries have a high biological productivity due to nutrient delivery and mixing processes. The salinity gradient between the fresh and salt water typically takes the form of a heavier saline wedge, mixed by flood and tidal flows. Major communities in the estuarine habitat may include juvenile fish, benthos, seagrass, mangrove, saltmarsh and wetland ecosystems. Estuaries are essential breeding grounds for many fish species and must be protected from habitat-damaging fishing practices such as trawling. Activities upstream can adversely impact the estuarine environment, for example agricultural runoff which may cause sedimentation and eutrophication. (See COASTAL ZONE MANAGEMENT, LITTORAL, EUTROPHICATION, BENTHOS, MANGROVE FOREST, SEAGRASS) (MP)

**ETHANOL:** see ETHYL ALCOHOL.

**ETHICAL ANALYSIS :** The application of ethical theory to specific moral problems. (DM)

**ETHICAL CODES :** See CODES OF ETHICS.

**ETHICAL INVESTMENT:** Financial involvement in ethical companies and sustainable practices which cause no depletion of natural assets or environmental degradation, have no involvement in weapons, uranium, gambling, tobacco or alcohol, and do not infringe the rights of workers, women, indigenous people, children or animals. Many may not agree with or be aware of the ways banks and superannuation funds use community savings to fund corporations with non-sustainable practices. The claim that the market is essentially "amoral" can be countered when knowledge is made explicit of the effects of specific capital flows on the future environment and community. Credit unions, "friendly" societies and local community banks are more consciously managed in the interests of members. Sets of company principles, commercial transparency and consumer watchdogs all facilitate ethical investment. Ethical companies may be involved in alternative energies and sustainable development, or in the creative and information industries where money can be generated without the involvement of natural resources. Appropriate share portfolios can be developed using indexes such as the Domini Social Index (DSI) of US ethical investments, or

managed through ethical investment funds like the Australian Ethical Investment Trust. The DSI and other ethical options can outperform the S&P 500 market index. The ethical and environmental sector has the potential to be a boom market as corporations are forced to address their responsibilities towards the planet. Shares in small, well-placed start-up companies dealing with environmental and information technologies generate risky but high returns. Marketing and promotion of ethical or environmental principles can increase consumer interest in a company. Visionary companies motivate with the use of well-defined goals, and sustainable corporations innovate with adaptable working conditions. In the realm of biotechnology companies, the ethics of an investment portfolio may be a matter of opinion. (See SUSTAINABLE CORPORATION, VISIONARY COMPANY, ECOLOGICAL ECONOMICS) (MP)

## **ETHICAL REGULATIONS**

**ETHICAL RELATIVISM** : The view that ethical principles vary, or ought to vary, among different groups or cultures. (See CULTURAL PLURALISM). (DM)

**ETHICAL REVIEW** : Committee review of patient care or research proposals for conformity with ethical guidelines. (See ANIMAL CARE COMMITTEES, ETHICS COMMITTEES). (DM)

**ETHICAL THEORY** : See ETHICS.

**ETHICIST, CLINICAL**: A hospital, sick fund, or health management organization employee who participates in ethical decision making in clinical medicine. The employer-employee relationship requires care about potential conflict of interest. Clinical ethicists may be involved only in standard bio-medical issues like DNR (q.v.), truth-telling, coercive treatment, etc., or might be called in to consult on questions of medical negligence, malpractice and the like. In some places, patients and their families are charged for ethics consultations. If the consultation is about withdrawing care from a terminal patient, the family may find themselves in a situation where the patient will not be allowed to die unless an ethicist's fee is paid.

It can be debated whether hospital ethicists are necessary or whether it would be better to encourage physicians and nurses to study ethics deeply and to take more direct responsibility for their decisions. If it is acknowledged that physicians are in the need of someone to observe and criticize their ethics, it can be debated whether the idea of the clinical ethicist is really the best solution, or whether nurses -- who are aware of everything going on in the wards anyway -- should be encouraged to speak out more, and to take more part in clinical ethical decision making. It can also be debated whether those who are learned in bio-medical ethics can make the best contribution by becoming clinical ethicists or whether they might contribute more as educators in medical and nursing schools, teaching physicians and nurses to understand ethical issues more deeply. (FL)

**ETHICS**: A system of moral principles or standards governing conduct. 1. a system of principles by which human actions and proposals may be judged good or bad, right or wrong; 2. A set of rules or a standard governing the conduct of a particular class of human action or profession; 3. Any set of moral principles or values recognized by a particular religion, belief or philosophy; 4. The principles of right conduct of an individual. Ethical behavior requires the ability to reason, to understand the consequences and to make choices about one's actions. As modern society changes and advances are made in technology, the prevailing ethical standards need to also evolve to incory) [Latin *ethicus* or Greek *ethikos* pertaining to "ethos" or character].

Traditional ethics was divided into Substantive ethics or meta ethics. Substantive ethics deals with "what are the rules?" and includes the utilitarian and Kantianism concepts, often both agree on practical applications. In Kantianism actions must subscribe other people as "ends in



themselves" and not as means to the ends of others or for self-gratification. In utilitarianism actions on the basis of their anticipated consequences (good actions maximize happiness or minimize unhappiness). (DM, IP, JA)

**ETHICS COMMITTEE:** Committees established by groups such as professional organizations to consider ethical issues. see INSTITUTIONAL ETHICS COMMITTEE. (DM+FL)

**ETHICS-OF-CARE** a more encompassing theory of bioethics incorporating the group-point of view; that is, an emotional commitment to, and willingness to act on behalf of persons with whom one has a significant relationship (see ETHICS-OF-RIGHTS). (IP)

**ETHICS-OF-RIGHTS** is a theory of bioethics which emphasizes the self-awareness point of view; that is, empowered by being informed or care through self-awareness (see ETHICS-OF-CARE). (IP)

**ethnic cleansing:** The mass expulsion or extermination of people from a minority ethnic or religious group within a certain area and who, in many instances, had lived in harmony for generations prior to the outbreak of national hostilities. Well publicized examples include ethnic atrocities experienced in the former Yugoslavia where the full extent of carnage committed, particularly between Bosnian Serbs and Bosnian Muslims, may never be revealed. War violates fundamental human decency but it is at its worst when actions are taken against the civilian population who then is subjected to atrocities such as rape, assassinations, massacres, torture and ethnic cleansing. (See GENOCIDE; EXTERMINATION; EUGENICS; CRIMES AGAINST HUMANITY; INTERNATIONAL HUMAN RIGHTS LAW; INSTITUTION OF WAR; BIOLOGICAL WARFARE; POST TRAUMATIC STRESS DISORDER). (IP)

**ETHNOCENTRISM** the belief that one's ethnic group has a mode of living, values, and patterns of adaptation that are superior to all others. It is coupled with a generalized contempt for members of other ethnic groups [Greek *ethnos* = nation]. (IP)

**ETHOLOGY** : The science of behavior, behavioral patterns of individuals and communities. (JA)

**ETHNOGRAPHY** : A part of anthropology to study racial characteristics and intra and inter cultural differences in their social, cultural and religious behavior. (JA)

**ETHYL ALCOHOL:** has the chemical formula  $C_2H_5OH$  and is the final product of fermentation of sugar by yeasts (see Alcohol). (IP)

**ETHYLENE** : Plant hormone involved in fruit ripening, gaseous at room temperature, capable of dispersal in environment. (JA)

**ETHYLENE OXIDE** : A disinfectant and an intermediate product in the production of various chemicals. Human exposure to ethylene oxide affects fertility. Its effect is classified as a substance "which should be regarded as if they impair fertility in humans" (JA).

**ETYMOLOGY:** Study of the history and evolution of words and language. (See LEXICOGRAPHY, LINGUISTICS, SEMIOTICS, CULTURAL EVOLUTION, MEME) (MP)

**EUBIOS:** Word coined in 1990 from the Greek Eu=good; Bios=life, to mean "good life". (DM)



**EUBIOS ETHICS INSTITUTE:** Institute founded in 1990 by Darryl Macer, in Christchurch New Zealand and in Tsukuba Science City in Japan. To review and update news and trends in bioethics from around the world, publishing books, journal and acting as a vehicle for interchange of opinions. Bioethics is broadly defined as life ethics, including both medical and environmental ethics, and environmental, ethical, legal and social issues arising from biotechnology. The organization is not for profit. Establishing networks of bioethics researchers, holding conferences and promoting bioethics education. The journal, *Eubios Journal of Asian and International Bioethics (EJAIB)*, is the official journal of the Asian Bioethics Association (ABA) and the IUBS Bioethics Program. The aim of the journal and books is to publish research papers, and relevant news, and letters, on topics within Asian Bioethics, promoting research in bioethics in the Asian region, and contributing to the interchange of ideas within and between Asia and global international bioethics. Asia is defined for the general purposes of this journal as the geographical area, including the Far East, China, South East Asia, Oceania, the Indian subcontinent, the Islamic world and Israel. More information on www site. (DM)

**EUCALYPTUS:** (from Greek: *eu* "well"+ *kalyptus* "covered", referring to the flower bud operculum). The eucalypts or "gum-trees" are a large genus of over 700 species of trees and shrubs endemic to Australia, making up the vast majority of forest habitat in that country. In addition to *Eucalyptus*, a new genus of eucalypts is now recognized: *Corymbia*, which includes the bloodwoods and ghost gums. Eucalypts are commonly cultivated worldwide, and provide valuable hardwood timber as well as eucalyptus oil used as a germicide and expectorant. (See SCLEROPHYLL FOREST) (MP)

**EUCARYOTE:** Cell or organism with membrane-bound, structurally discrete nucleus and other well-developed subcellular compartments. Eucaryotes include all organisms except viruses, bacteria and blue-green algae. Compare *procaryote* .. (DM)

**EUGENICS:** Attempts to improve hereditary qualities through selective breeding. See *positive eugenics, negative eugenics, eugenics of normalcy* . Eugenics is defined " *as any effort to interfere with individuals' procreative choices in order to attain a societal goal* ". Word means " *good breeding* " from the Greek names Eugene and Eugenia expressing the notion of "well born" which was a celebration of parent's belief that their offspring are especially blessed. The term was coined by Sir Francis Galton, an English scidea has been abused in the past; for example, by the Nazis in the 1930s and early 1940s, and some countries haven eugenics is based on eliminating genetic disorders. (See ETHNIC CLEANSING) (DM+IP)

**EUGENICS OF NORMALCY:** Policies and programs intended to ensure that each individual has at least a minimum number of normal genes. (IP)

**EUPHEMISM:** (Greek: *euphemismos* "good speech") Terminology or language which puts a favorable connotation on a sensitive word. Early euphemisms probably arose as discreet references to revered deities. The use of euphemism for political, medical and sexual concepts flowered in the decorous and dignified language of Renaissance and Victorian aristocracy. These courtly circumlocutions were described as "euphuism" by John Lyly in his 1578 satire *Euphues* . Euphemisms may be created by widening concepts, semantic shifts, metaphor or phonetic distortion. Euphemism provides the useful bioethical function of avoiding offense and reducing unpleasant psychological associations from fearful or grievous situations such as death. However, euphemisms are also employed in deceit and propaganda to obscure embarrassing concepts and practices in politics (e.g. people's dem, freedom fighter, peace enforcement, pre-emptive strike and preventive war). (See METAPHOR, AMBIGUITY, COLLATERAL DAMAGE, FRIENDLY FIRE) (MP)

**EUROPEAN PATENT CONVENTION** : Under the European Patent Convention of 1978 the EPO was established as an international patent-granting authority. (JA)

**EUROPEAN PATENT OFFICE** : A governing body for granting Patents on novel inventions. It examines a patent application whether it meets the patent criteria for patenting. The fee levied for a patent is used to run the EPO. Patents granted can be challenged in a court of law by a third party by submitting an "opposition" to the EPs, these members are the EPC contracting states. (JA)

**EURYTYPIC SPECIES**: A species which has a large tolerance to environmental change, typically with a wide geographical distribution. (See STENOTYPIC SPECIES, ENVIRONMENTAL GRADIENT) (MP)

**EUSTRESS** : Happy stress from the Greek *eu* meaning happy or well. In biology stress is essentially reflected in the total rate of all the wear and tear caused by life and, although it is impossible to avoid stress, a lot can be learnt about how to keep its damaging side effects to a minimum. Stress is personal - invigorating for some, devastating for others; thus, the stress experienced depends not so much on what we do or what happens but on the way we take it. Characteristics such as self-confidence, reliance, trust, esteem and a flexible motivation springing from an inner strength all lower distress and heighten eustress. Additionally, eustress increases productivity and learning, whereas prolonged distress has the opposite effect. (See DISTRESS; STRESS; GENERAL ADAPTATION SYNDROME). (IP)

**EUTHANASIA**: The merciful hastening of death, often limited to willful and merciful actions to kill of one who is injured or terminally ill. (in Greek " *an easy death* ").(See DOCTOR-ASSISTED SUICIDE) (DM)

**EUTHERIAN MAMMAL**: See MARSUPIALS, MONOTREMES.

**EUTROPHICATION**: (Greek *eu* well + *trephein* to flourish). The addition of nutrient material, mostly from domestic sewage, some industrial wastes and the leaching of fertilizers from agricultural lands, into rivers and lakes with the subsequent flourishing of algae and microorganisms. This results in the depletion of dissolved oxygen and the potential suffocation of other aquatic organisms (see ALGAL BLOOMS). (MP & IP)

**EVALUATE**: 1. to assess, appraise value 2. to find numerical expression - give a measurement of the worth of something in the units deemed appropriate [French *evaluer* value] (IP)

**EVALUATION STUDIES** : Indicates that the document describes a study that uses the methods of the social sciences or statistics to analyze either the impact or effectiveness of practice or policy decisions, or the values used in making such decisions. (DM)

**EVANGELIUM VITAE** : Encyclical Letter of Pope John Paul II on the value and inviolability of human life, issued March 25, 1995. The Encyclical is the reference document on Bioethics for Catholics. It deals specifically with abortion and euthanasia, but also with all issues related to the "Culture of Life": family, feminism, population growth, birth control, self-defence, death penalty, the meaning of suffering. (PC)

**EVENT HORIZON** : The event horizon, or 'Schwarzschild radius', refers to the gravitational 'point of no return' surrounding a black hole. Beyond this point matter and light are captured by the black hole, preventing the possibility of any return or communication back across the event horizon. (See BLACK HOLE, IRREVERSIBLE DAMAGE) (MP)

**EVIDENCE:** Expert knowledge, information or data which supports an assertion or hypothesis. (See EVIDENCE-BASED MANAGEMENT, VALIDATION, EMPIRICAL) (MP)

**EVIDENCE-BASED MANAGEMENT:** The use of existing data and on-going monitoring of indicators to determine the most appropriate management strategies. In practice this may mean that environmental management should have stronger links to scientific recommendations than to political whims. If the best available information is inadequate, the precautionary principle should be considered and action should not be taken/delayed while waiting for better evidence. (See ADAPTIVE MANAGEMENT, BEST AVAILABLE INFORMATION, BEST CURRENT PRACTICE, PRECAUTIONARY PRINCIPLE, ENVIRONMENTAL MONITORING, ENVIRONMENTAL INDICATORS). (MP)

**EVIL:** The ancient religion of Manichaeism taught that the world derives from two principles, the Principle of Good and the Principle of Evil, which are always in conflict with one another. Christianity, holding that God is entirely good, and has created everything, had to deny the real existence of evil, and to reject Manichaeism as a heresy. Christian philosophers attempted to explain the apparent existence of evil in the world by saying that evil does not really exist, but is only the *privation*, or lack of good. A lie, therefore, is only a falling-short of honesty. Meanness is only a falling-short of generosity. Cowardice is only a falling-short of courage. And gluttony is only a falling-short of self control. This doctrine has much to recommend it in terms of its value in encouraging a charitable attitude towards others. Rather than harping upon the faults of others, let's not look at their lacks, but at their positive qualities.

This doctrine, however, seems to be at its best when it is a question of the rather minor faults and errors of our friends and neighbors, and of ourselves: where it is good advice to overlook the sins and focus on the virtues. But what about a terrorist leader, who plays on the religious faith of some poor fool, indoctrinates him with venom, dopes him up, and with metaphysical promises gets him to go blow himself up in a bus full of simple working people and schoolchildren? Should we ignore the evil of this act and focus instead charitably upon the virtues of the terrorist leader, such as that he pays his debts in time and brings his wife flowers regularly?

Unlike Manichaeism, Judaism does not recognize evil as a principle equal in power to good. But unlike Christianity, Judaism does not deny the real existence of evil. Nor does Judaism have any article of faith according to which God is all perfect and incapable of doing evil. Indeed when God threatened to kill all of Sodom, Avraham found this ethically abhorrent and argued: "Shall not the Judge of all the earth do right?" (Genesis XVIII, 25) Judaism believes that God creates both good and evil, and commands us to bless God for both. We do not, however, know God's reasons for anything, including God's reasons for creating evil. We can guess that God perhaps creates evil in order to put us through experiences which will help strengthen and improve our souls, an idea which fits in well with the doctrine of reincarnation. But this is only a guess. God's real reasons for doing anything (if God indeed has reasons in any sense of the word "reason" which we can understand) are mysteries which are for God, and not for us, to know. (FL)

**EVOLUTION:** 1. Any series of gradual or punctuated changes through time. 2. In biology, the continuous genetic adaptation of species to environmental change by the agencies of natural selection, hybridization, inbreeding and mutation. The theory of evolution by natural selection was first popularized by British naturalist Charles Darwin in *The Origin of Species* (1859) and has since been supported by scientific research

such as breeding experiments. (See FOSSIL RECORD; GAIA HYPOTHESIS, NATURAL SELECTION, ORIGIN OF LIFE, PUNCTUATED EQUILIBRIUM, SPECIATION). (MP & IP)

**EVOLUTIONARY ALGORITHM:** See GENETIC ALGORITHM.

**EVOLUTIONARY PSYCHOLOGY :** applies evolutionary reasoning to psychological phenomena and embraces three key guided by specialized cerebral mechanisms performing specific shaped these modular cognitive mechanisms to produce adaptive these modular products of our evolutionary history are designed to produce very specific adaptive outcomes (for example, male preference for mates who are youthful, healthy and beautiful) (see GAIA HYPOTHESIS, HUMAN BEHAVIORAL ECOLOGY and DUAL INHERITANCE THEORY). (IP)

**EXECUTIVE INFORMATION SYSTEM:** See EXPERT SYSTEM.

**EXERGY:** An uncommonly used term, exergy is the measure of work that can be extracted from a system. A low entropy system such as the biosphere may have a high level of exergy. (See ENERGY, ENTROPY, WORK) (MP)

**EXISTENCE VALUE:** Allocation of value to ecosystems and the natural environment as a reflection of human desire for their continued existence - despite no expectation of actual contact or use of the resource. Although less selfish than values derived from direct use, existence value is still slightly anthropocentric in that it reflects human sympathy and preferences rather than any naturally inherent intrinsic value. (See INTRINSIC VALUE OF NATURE, INSTRUMENTAL VALUE OF NATURE, BEQUEST VALUE, OPTION VALUE, ENVIRONMENTAL VALUATION) (MP)

**EXO BIOLOGY:** A branch of biology that studies the occurrence of extra terrestrial life in other planets outside of our biosphere and beyond. (JA) (See ASTROBIOLOGY)

**EXONS :** The protein-coding DNA sequences of a gene. Compare *introns* . (DM)

**EXOTIC:** Describing a species not originating in the place where it is found; a nonnative, introduced species. (See INTRODUCED SPECIES)

**EXOSPHERE** refers to the outermost portion of the atmosphere beginning at a height of about 500 km (see BIOSPHERE, CRYOSPHERE, HYDROSPHERE & OZONE HOLE). (IP)

**EXOTOXIN:** A poison excreted by some gram-negative or gram-positive organisms. It is composed of protein. (DM)

**EXPERIMENT :** (Latin *experimentum* 'see') a trial, special test or observation made to confirm or refute something in doubt or for testing a hypothesis. (IP)

**EXPERIMENTAL GROUPS:** The treatment groups, or subjects which received measured exposure to a certain variable (e.g. medication), as opposed to the control groups (e.g. placebo) which are the same in all respects *except* for the treatment variable under examination. (See CONTROL GROUPS, DOUBLE BLIND EXPERIMENT) (MP)

**EXPERT:** (Latin: *expertus* "known by experience") Experts possess detailed current knowledge and an ability to process complex information. Their expertise may derive from proficiency in specialised skills, depth or range of knowledge, or decisive wisdom in judgement. Critics maintain that expertise from a single professional field poorly equips the specialist for problems in a broad, interconnected and complex world. Narrower specialised knowledge should be supplemented by higher order knowledge of the context, for example interrelated concepts, spatiotemporal relationships and processes of change. Experts have a privileged position of community trust as sources of knowledge, and this implies professional ethical responsibility in the gathering, distribution and use of this knowledge for decision making. (See EXPERTISE, EXPERT SYSTEM) (MP)

**EXPERT SYSTEM:** Expert systems and decision support systems are software which mimic the inductive or deductive reasoning of a human expert. Complex problems such as diagnosis, prediction, interpretation, planning and design are modelled and solved using inferences from facts and rules derived from expert knowledge. Expert systems may be defined by their task specialization and performance, problem solving ability in a given domain, ability to reformulate a problem, efficiency, complexity or symbol manipulation. Such software is the practical application of artificial intelligence research. Expert systems for management advisory and executive decision support have been deployed in industries such as medical diagnosis, mineral prospecting, military planning, engineering and finance. (See ARTIFICIAL INTELLIGENCE, EXPERT, EXPERTISE) (MP)

**EXPERT SYSTEM SHELL:** Software containing the basic non-specialized components of an expert system such as the inference mechanisms and user interface, but not including the specialized knowledge base. The addition of expert knowledge to this shell creates a new expert system specialized for a specific domain. (See EXPERT SYSTEM) (MP)

**EXPERT TESTIMONY :** The presentation of pertinent information by a qualified specialist before a court or governmental body. (DM)

**EXPERTISE:** Expertise is usually defined by scope of detailed current knowledge and range of experience within a professional field or fields. It may also be expressed as proficient ability with a skilled task and familiarity with its performance. Other characteristics commonly regarded as comprising expertise include a combination of the following: high level attention, perception, concentration, cognitive processing and analytical intelligence, knowledge of context and complexity, understanding of fundamental patterns and processes, ability to understand abstract concepts, intellectual confidence in decision making, creative ability with ideas and concepts, selectivity regarding the relevance of information, adaptability to change, strong co-operation and communication skills, credibility of reputation, and a strong sense of professional ethical responsibility for choices made. (See EXPERT, EXPERT SYSTEM) (MP)

**EXPONENTIAL:** Something grows exponentially, i.e. geometrically, if it increases (or decreases) by a constant factor with each unit of time. For example, the value of money decreases exponentially with time if the inflation rate remains constant. For much of human history, world population size has been increasing exponentially or even at a greater than exponential rate. This cannot continue for many more decades. (MR)

**EXPLOITATION :** 1. Taking unjust advantage of another or utilize a person for one's own profit or benefit 2. utilization by application of industry, argument or other means, as the taking advantage of a mine or an old-growth forest. (IP)

**EXPLORATORY RESEARCH:** Initial broad investigations, such as baseline monitoring or pilot studies to determine the nature of the subject and priority problems for research. (See PILOT STUDY, RESEARCH AND DEVELOPMENT) (MP)

**EXPLOSIVES** : Substances such as gunpowder, cordite, nitroglycerine and TNT which decay rapidly under certain conditions, causing sudden violent expansion with a shock-wave of kinetic energy, sound, light and heat. Explosives are the basis for most modern weapon and rocket systems, from the handgun to the nuclear bomb. The primary purpose of explosives in warfare is the destruction of people and infrastructure. The purpose, precision and effectiveness of this task are obviously matters of bioethical concern. Factors influencing the consequences of the use of explosives include type of weapon, impact precision, burst specifics, explosive yield, lethal radius, ground characteristics and target density. (See EXPLOSIVE YIELD, TNT, BALLISTICS, MISSILES, LAND MINES, NUCLEAR WEAPONS) (MP)

**EXPLOSIVE YIELD** : The strength of explosive energy contained within a bomb or nuclear warhead, expressed as the equivalent tonnage of TNT required to produce the same explosion (one ton of TNT releases about 106 calories of energy). For example the 20 kiloton atom bombs dropped on Hiroshima and Nagasaki had an explosive yield equivalent to 20,000 tons of TNT. Other nuclear weapons have been tested with explosive yields up to 70 megatons. (See EXPLOSIVES, TNT, NUCLEAR WEAPONS) (MP)

**EXPRESSED SEQUENCE TAG** : A segment of DNA corresponding (can be used as a tag) to turned on genes in a particular tissue/organism. (JA)

**EXTENT OF OCCURRENCE**: See POPULATION DISTRIBUTION.

**EXTERMINATION** : 1. The complete destruction of a population or community of living organisms, for example pests or vermin. (See EXTINCTION) 2. Intentional infliction of insufferable conditions for life (e.g. prevention of access to water, food, medicine or safety) with the intent of destroying some segment of a population. (See GENOCIDE, CRIMES AGAINST HUMANITY, ETHNIC CLEANSING) (MP)

**EXTERNALITIES**: Variables affecting human welfare which are impacted by economic processes, but not calculated or recompensated in economic terms. The generators of externalities and those benefited/impacted would be taxed or subsidized accordingly in a broadly sustainable system. Various categories of externalities include pareto-relevant, pecuniary, technological, private/public goods, socio-cultural amenities, pollution and natural resource values. In the interests of 'economic efficiency' corporations/governments often don't factor in these external costs, to the detriment of society and the environment. (See OPPORTUNITY COST, EFFICIENCY, ENVIRONMENTAL ECONOMICS) (MP)

**EXTINCT**: No longer existing in living form as a species, having died out as a result of the normal dynamic of evolution or commonly also due to human disturbances such as habitat destruction. Current programs to store and perhaps restore frozen DNA of extinct species are commendable only if they take no pressure off efforts at conservation of the living organisms; after all we aren't able to recreate the most significant units of nature, complex ecosystems. (See EXTINCTION, ENDANGERED SPECIES) (MP)

**EXTINCT IN THE WILD**: A taxon which has not been recorded in expected habitat over an appropriate time frame throughout its past range. Such species may survive only in captivity, cultivation or as a naturalised population away from its original wild habitat. (See ENDANGERED SPECIES, GHOST SPECIES, EXTINCTION) (MP)

**EXTINCTION**: Extinction is the termination or extinguishing from the Earth of an evolutionary lineage such that they no longer exist in living form. Anything which ceases to exist can also be said to undergo extinction, such as outmoded technology, information, beliefs or behaviours. In psychology and physiology, extinction is a decline in a learned or stimulus response in the absence of reinforcement. Extinction

however most often refers to the loss of a group of organisms, usually a species but ranging from a local population to a phylum. We are currently experiencing a human-driven mass extinction, and extrapolations from current trends predict the rapid extinction of approximately half of the species on Earth. This mass extinction is the result of rapidly expanding human populations and our excessive focus on economic growth, with the associated development, pollution, hunting, pest introductions, land degradation, habitat destruction and ecosystem fragmentation. This massive loss of life will have serious global repercussions for the future of natural biodiversity, ecosystem processes, habitat stability and other essential ecological functions. Even from a purely anthropocentric point of view which ignores the intrinsic value of nature, this mass extinction is resulting in rapid loss of information and ideas, new patterns and processes, chemical and food products, and other economic, aesthetic and spiritual opportunity costs. Perhaps the greatest danger from this extinction of biodiversity is the risk of undermining the stability and homeostasis of the Earth's self-sustaining feedback mechanisms, possibly resulting in a world uninhabitable to humans. (See **EXTINCT**, **MASS EXTINCTION**, **HUMAN EXTINCTION**). (MP)

**EXTRACHROMOSOMAL DNA:** DNA not associated with the chromosome(s), for example, plasmid DNA or organelle (mitochondria or chloroplast) DNA).

**EXTRAORDINARY TREATMENT :** Therapeutic measures which cannot be obtained without excessive expense, pain, or other burden, or which, if used, would not offer a reasonable hope of benefit. (See **FUTILITY**). (DM)

**EXTRASENSORY PERCEPTION (ESP):** The alleged ability to perceive or receive information from beyond the natural range of the five senses. ESP takes various forms, including alleged awareness over a distance of events (clairvoyance), thoughts (telepathy) or feelings (telesthesia), sometimes ahead of time (precognition). Biotechnology such as cybernetic connections between neurons and microprocessors in combination with wireless internet technology or virtual reality may in the future potentially allow the simulation of some of these forms of ESP involving distance. (See **CLAIRVOYANCE**, **PRECOGNITION**, **PSYCHOKINESIS**, **TELEPATHY**, **TELESTHESIA**) (MP)

## F

<a href="#">A</a>	<a href="#">B</a>	<a href="#">C</a>	<a href="#">D</a>	<a href="#">E</a>	<a href="#">F</a>	<a href="#">G</a>	<a href="#">H</a>	<a href="#">I</a>	<a href="#">J</a>	<a href="#">K</a>	<a href="#">L</a>	<a href="#">M</a>	<a href="#">N</a>	<a href="#">O</a>	<a href="#">P</a>	<a href="#">Q</a>	<a href="#">R</a>	<a href="#">S</a>	<a href="#">T</a>	<a href="#">U</a>	<a href="#">V</a>	<a href="#">W</a>	<a href="#">X</a>	<a href="#">Y</a>	<a href="#">Z</a>
<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**FACILITATION:** More than just mediation, which attempts to find compromise resolutions to a conflict, facilitation is third party intervention which also defines behavior in the wider social context to help facilitate understanding of broader causes, perspectives, values and relationships. (See **MEDIATION**, **NEGOTIATION**, **DISPUTE**, **CONFLICT**, **CONFLICT RESOLUTION**, **THIRD PARTY**, **PEACE**)

**BUILDING) (MP)**

**FACTOR VIII:** Blood clotting elements are known as Factor V, VIII and IX. They are extracted from a collection of blood samples. It is important that hemophiliacs do not receive contaminated blood. (JA)

**FACTORY FARMING:** Production of meat or other animal products under industrial conditions. Although there are situations in which the industrialisation of animal husbandry can have animal welfare benefits - e.g. the practice of bringing lambs indoors after birth - the general consequences for animal welfare have been negative. Factory farming only became widespread and significant during the second half of the twentieth century. It helped to lead to large falls in the cost of animal products but has increasingly been criticised on bioethical grounds. Some countries are now, slowly, legislating against certain factory farm practices, such as excessive overcrowding and the prophylactic use of antibiotics. (MR)

**FAHRENHEIT (°F) :** (German physicist Daniel Fahrenheit 1686-1736). A scale of temperature in which the freezing point of water is 32 ° F and the boiling point is 212 ° F at one atmosphere of pressure. (See CELSIUS DEGREE, TEMPERATURE) (IP)

**FAITH:** Usually thought of as a belief which is not founded upon experience, scientific evidence, or deductive reasoning (q.v.). The idea of faith is strong in Christianity. Although it exists in Judaism, it is not clear how much of the idea is original to Israeli sources, and how much is adopted from Christianity. Epistemologically, it is extremely difficult to distinguish between faith, indoctrination and emotional enthusiasm. It should be discussed whether a deep inner calmness may serve us more strongly in times of need, than can religious faith. (FL)

**FALLACY:** 1. In philosophy, a fallacy is a logical breach or fault in an argument. A logical or formal fallacy is an invalid argument in which the premises do not deductively imply the conclusion. 2. More broadly, a belief which, although it may be widespread in the community, happens to be wrong. (See FALSIFICATION, PROOF, LIES) (MP)

**FALLOPIAN TUBE:** Either of a pair of tubes that conduct the egg from the ovary to the uterus. Fertilization normally occurs within this structure. Blocked or scarred fallopian tubes are a leading source of infertility in women. (IP)

**FALSIFICATION:** Outside of philosophy, to falsify may mean to fake evidence for a theory, but more technically in the philosophy of science, 'falsification' is the process of showing a theory or hypothesis to be false. This method, emphasized by Karl Popper in his *Logic of Scientific Discovery*, is one of the most powerful determinants of probable truth. The process begins with a hypothesis, the opposite of which is thus the null hypothesis, which is then attempted to be experimentally disproved. This experimental rejection of the null hypothesis is indirect proof which lends support to the hypothesis, but does not ultimately prove it. Because of the difficulties of confirmation and ultimate proof, the critical method of falsification is the primary process at work in the advancement of science. (See SCIENTIFIC METHOD, EMPIRICISM, HYPOTHESIS, PROOF) (MP)

**FAMILIAL DISAUTONOMY (FAMILIAL DISAUTONOMIA) :** An autosomal recessively inherited disease, most commonly seen in Ashkenazi Jewish children. It was first described by Reilly and Day in 1949, and in 1993 the responsible gene was located somewhere on



chromosome 9, a fact which makes it possible to identify the carriers but not the diseased fetus. Patients with FD suffer from autonomic neuropathy affecting the glossopharyngeal or vagus nerves, baroreceptor response and other sensory and motor neuropathies. Orthostatic hypotension is the most disabling aspect of FD, others include disturbances of sweating, salivation, and swallowing. Treatment consists of symptomatic and preventive measures including medication, physiotherapy, behavioral, and family treatment. The ethical approach for Familial Dysautonomia is a paradigm for most of the genetic diseases and includes different issues: 1.genetic screening. One must decide if it preferable to screen the whole population in Israel or just Ashkenazi Jews or just families with known members with FD who want to have children. 2.If one tests positive for FD during pregnancy, the physician must decide whether to recommend an abortion without knowing if the fetus is a carrier or a diseased child. In religious families, can we recommend an abortion without knowing the attitude of the patient's spiritual guide towards abortions and even the discussion may cause the family anguish and perhaps shame and guilt feelings? 3. When there is a child born with FD who needs an expensive treatment, should a state, or state subsidized, health service pay for it at the expense of treatment for other diseases or should the cost be shared with the family? Should the state also have to pay for complementary medicine including herbal and oriental medicine, which in certain cases can help relieve some of the symptoms although it is not evidence based medicine? Other ethical aspects concern the medical staff: doctors, nurses, physiotherapists etc. who needs to maintain neutrality even if they object to abortions. If they make recommendations, and the family does not cooperate, they still must relate to the family and continue the treatment with intensity and compassion. There are many open questions and some of the answers depend on cultural, behavioral and religious opinions of families, medical staff and the public. (AZ)

**FAMILY** 1. any group of persons closely related by blood or choice like parents and their children including adopted 2. all those descended from a common progenitor 3. in biology the major subdivision of an order or suborder, commonly comprising several generations. (GK)

**EXTENDED FAMILY** In many developing countries, the family unit includes grandparents, aunts and uncles and even more distant family members that might live together in a common house and exert parenthood towards small children. Conversely, adults take care of their parents until death, taking over the costs of an extended household in these types of families. (GK)

**NUCLEAR FAMILY** Indicates the family made up of father, mother and children (biological or adopted). Many laws in developing countries, especially catholic, legislate for housing, subsidies, etc, for the nuclear family, ignoring the complex reality of different sorts of family units. Moreover, many of these laws recognize the father as the head of the nuclear family, whereas a great amount of these are fatherless families, where the mother is the head, but without prerogatives face to the law. (GK)

**UNIPARENTAL FAMILY**: A family made up of only one of both parents and its children. Today, in most uniparental families the parent who is missing is the father. Most of these families are to be found in third world countries, where their occurrence is the result of a fatal incident: in many cases the father is missing because he has abandoned his family, in others because he has been killed during war or violence bursts of different sources. Single women can also decide to have children, in which case the uniparental family is the result of a choice. (GK)

**FAMILY PLANNING** : Programs or services designed to help people avoid unwanted births or control the interval between pregnancies. (See Natural Family Planning Methods , CONTRACEPTION, POPULATION CONTROL). (DM)

**FAMILY PRACTICE** : The branch of medicine concerned with the provision of continuing, comprehensive health care for the entire family. (See GENERAL PRACTICE). (DM)

**FAMILY VALUES**

**FAMINE:** Famine is widespread risk of death by starvation and malnutrition; a devastating condition of insufficient food supply, usually combined with shortages of water and medicine. Famine affected countries have included Ethiopia, Somalia, Iraq, Afghanistan and North Korea, exacerbated by drought, political mismanagement or conditions of war. Emergency food aid should be deployed efficiently and independently of any economic sanctions or political concerns. (See FOOD AID, FOOD CRISIS, MALNUTRITION) (MP)

**FAO:** UNITED NATIONS FOOD AND AGRICULTURAL ORGANIZATION.

**FAQIH :** From Arabic root, f.q.h. literally means a scientist, well-informed, clever. In the Islamic society Faqih is a person who is an Islamic scholar to teaches and guides to Islamic faith. Who spends years of study in Islamic law, jurisprudence, philosophy, ethics as well as being engaged in self-purification. Muslims can refer to him in order to find the answer for their religious questions. (AB)

**FAS:** See FETAL ALCOHOL SYNDROME .

**FASTING :** Abstaining from food (and drink). This practice is found in many of the world's religions and traditions. In some cases, the abstention is total, as in Jewish fasts, and the Muslim fast of Ramadan, and in other cases, the abstention is in limiting the range of foods eaten, as in some Buddhist and Hindu traditions. Generally, when the abstention is total, the time limit is sunrise to sunset, or 24 hours. If the abstention is partial, the duration of the fast may be a number of weeks, depending on the tradition. (AG)

**FATWA :** (Arabic *fatā* 'to instruct by a legal decision'). A generic term for any legal decision made by a Mufti or other Islamic religious authority. The term acquired familiarity in the West when in 1989 Iran's Ayatollah Khomeini issued a fatwa sentencing the British writer Salman Rushdie to death for publishing *The Satanic Verses* which was considered by many Muslims as blasphemous and extraordinarily offensive. The word, however, does not necessarily mean a death sentence. (IP)

**FAUNA :** The community of all animals living in a place. Fauna and flora was traditionally used to refer to all organisms living in a place, but technically this would not include fungi, protists, bacteria, and archaea. (RW)

**FBI:** Federal Bureau of Investigation (U.S.)

**FDA :** see FOOD AND DRUG ADMINISTRATION

**FEAR :** 1. (Middle English *fer* 'danger') the feeling of anxiety related to an identified source threatening potential personal harm or safety of another; apprehension of approaching danger 2. state of alarm generated by the neuroendocrine response to threat causing muscular and psychological tension that interferes with the normal processes of living. (See ADRENALINE; GENERAL ADAPTATION SYNDROME; FIGHT OR FLIGHT RESPONSE). (IP)

**FEEBLE-MINDED :** Little used pejorative term referring to arrested or incomplete development of the mind, including subnormality of intelligence ranging from slight to severe. Other outdated disparaging terms in this category are 'idiots', 'imbeciles' and 'mongols' that describe individuals having an IQ between 50 and 69. (See INTELLIGENCE, INTELLIGENCE QUOTIENT, FETAL ALCOHOL SYNDROME, AUTISM, DOWN'S SYNDROME). (IP)

**FEEDBACK:** 'Feedback' is the flow of changes through a system which come back in a circle to again affect the initial cause of the change. This 'feedback loop' is a continuous re-iterative cause-and-effect relationship between interactive elements and adjusting subsystems. 'Positive feedback' reinforces the original process and 'negative feedback' suppresses the original process. Automatic feedback control and cybernetics are important to adaptive intelligence in both humans and machines. 'Reinforcing feedback' increasingly alters the system away from its initial point as each change amplifies the next (e.g. population growth, epidemics, cancer, debts, self-advancement). 'Balancing feedback' dampens the effect, usually, a negative and relationships. (See FEEDFORWARD, CYBERNETICS, SYSTEMS THEORY, SYSTEM DYNAMICS, COMPLEXITY THEORY, CATALYST, THRESHOLD, POSITIVITY) (MP)

**FEEDFORWARD:** A sort-of 'positive balancing feedback', 'feedforward' drives a system (MP)

**FEMALE** : 1. Organisms whose reproductive organs produce only female gametes; that is, eggs in animals or ovules in fruit-bearing plants. 2. may also be used as a derogative metaphor suggestive of 'weakness' or 'inferiority'. (See MALE; FEMINISM). (IP)

**FEMALE CONDOM or Femshield** : is a relatively new barrier method of contraception which is female-based, gives protection against sexually-transmitted diseases including AIDS, and is not dependent on male erection and intromission. The Femshield consists of a polyurethane vaginal sheath lining the whole vaginal surface, is stronger and lighter than the latex rubber used in male condoms, easy to insert and is used in conjunction with a lubricant. Women find it very effective being attracted to their control of contraception and protection against disease (see CONDOM). (IP)

**FEMSHIELD:** see FEMALE CONDOM.

**FEMALE GENITAL MUTILATION** is an ancient practice which is said to predate most modern religions, including Christianity and Islam on account of its not being mentioned anywhere in the Quran or the Hadith collection of Al-Bukhari; that is the collections of traditions about Muhammad and his companions. The practice as it endures today covers a graded series of alterations to the female genitalia, ranging from mild to most severe. "Sunna" or circumcision is the mildest form where the hood of the clitoris is removed only; clitorrectomy involves the removal of the entire clitoris as well as the labia minora; infibulation involves the removal of the clitoris, labia minora, labia majora and parts of the vulva. After infibulation, the remaining tissue mass is sewn together with catgut or held together with thorns, leaving a tiny hole for urine and menstrual blood to pass through. Deinfibulation and reinfibulation occurs when it is decided that the woman should conceive and give birth. Genital mutilations cause local infections, generalized septicemia, life-long problems with urination and menstruation, chronic pain, suffering and death and is an extreme example of abuse resulting from culturally-driven control of female sexuality. Worldwide, it is estimated that 130 million girls and women, mostly African, have been affected by the practice and that a further 2 million are at risk every year. (IP+AG)

**FEMICIDE** : The killing of a woman, one who kills a woman. (See FETICIDE). (IP)

**FEMINAZI** : A contemptuous blended term for a radical feminist. The use of the word was originally associated, in the early 1990s, with the abortion debate and was applied to women who supported the pro-choice movement. The term has now spread outside the abortion issue into general use. (See FEMINISM). (IP)

**FEMINISM (FEMINIST MOVEMENT)** : A widespread and extremely influential movement by women against male-dominated society.

Feminists demand abolition of the double standard, removal of traditional stereotypes representing women as fragile, dependent and passive, equal pay for equal work and the right to social and sexual equality. (See FEMINAZI). (IP)

**FERMENTATION:** The process of growing microorganisms.

**FERTILITY** : The ability to reproduce. In women days 10-18 from the beginning of the menstrual period are considered the days of highest fertility. Fertility is the ability to produce a offspring or a progeny. Many factors are known to impair fertility such as environmental mimics of estrogen due to the use of chemical fertilizers, plastics, chemicals used during pregnancy. (See INFERTILITY; FERTILITY RATE). (IP,JA)

**FERTILITY DRUGS:** Compounds used to treat ovulatory dysfunction. These include clomiphene citrate, human gonadotropins, bromocriptine, glucocorticoids and progesterone. (IP)

**FERTILITY RATE** : The number of pregnancies per year per 1,000 women of childbearing age. (See FERTILITY; INFERTILITY). (IP)

**FETAL ALCOHOL SYNDROME (FAS):** a set of congenital psychological, behavioral and physical abnormalities in infants whose mothers consumed alcohol during pregnancy. The syndrome was first reported in 1968 by the French pediatrician Lemoine and his colleagues who described a distinct pattern of anomalies in babies born to families with a history of chronic alcoholism. The anomalies included growth deficiency, reduced brain size (microcephaly), a cluster of anomalous facial characteristics, cardiac defects, limb deformities, central nervous system dysfunctions resulting in attention-deficit hyperactivity disorder, delays in psychomotor and language development, poor visual memory and psychosocial maladjustment. The IQ of the children described was about 70; however, the severity of mental and physical disability is related to the degree of alcohol exposure *in utero* and to varying genetic susceptibilities in the fetus. Of all the characteristics of FAS, mental disability is the most damaging and consistent consequence, and alcohol is now the leading cause of intellectual disability in the western world, followed by Down's syndrome and cerebral palsy. The detrimental consequenc children and the consumption of alcoholic beverages by young married couples was prohibited in ancient Greek and old testament writings. (IP)

**FETAL REDUCTION** : The deliberate therapeutic removal of one or two fetuses following the diagnosis of a multiple pregnancy. Multiple pregnancy is not solely a specific risk of *in vitro* fertilization treatments, where two or three-embryo transfers are permissible, but also because the incidence of multiple births has been steadily increasing in all developed countries since the early 1980s. Preterm delivery and low birth weight are the main causes of increased morbidity and mortality in the neonatal period. The average duration of pregnancy is 38 weeks for singletons, 37 weeks for twins, 33.5 weeks for triplets and 31.5 weeks for quads. Parents of multiple-birth children face not only a significant higher risk of one of their children having a disability but a further specific risk owing to the fact that compared to singletons, there is a 3-7 fold higher incidence of cerebral palsy in twins and over ten-fold higher incidence in triplets. The perinatal mortality rate in twins is nearly five times higher than in singletons and in triplets eight times higher. The main contributor to the high morbidity and death rate in multiple births is prematurity and its complications. It is easy to see that for some couples faced with the risk of death or disability to one or more of their children, a fetal reduction may seem the best option; but this is not an easy or uncontroversial solution as it too carries its own risk of medical

and emotional complications. (See INTRAUTERINE GROWTH RETARDATION; PREMATURITY; SUDDEN INFANT DEATH SYNDROME). (IP)

**FETAL GERM CELLS (FG)** : Germ cells of fetal origin. (JA)

**FETAL THERAPY** : In utero therapy. (DM)

**FETOGENIC PERIOD** : In humans lasts from week 9 to birth where important developments are general body growth, histological and functional development of organs and the histological development of the central nervous system (CNS). Approximately 38 weeks post-conception in humans (40 weeks post=last menstrual period). Brain development, however, occurs during the entire period of fetal differentiation and through the first 2 years of postnatal life. Drug abuse during gametogenic, embryonic and fetogenic periods may harm normal growth and development in the offspring and increase its changes of being born with birth defects, low birthweight, and mental/behavioral deficits (see embryonic period, teratology, embryo and fetus). (IP)

**FETUS**: Fetus A stage in human development / embryonic development in uterus. The developing human individual from the ninth week after fertilization until birth. (DM+JA)

**FOETUS**: See FETUS.

**FERTILIZATION**: The event that initiates the development of an oocyte into embryonic development, normally triggered by the entry of a sperm into the oocyte. (IP)

**FERTILIZATION**: the fusion of a sperm (male gamete) and an egg (female gamete) to form a zygote. (JA)

**FINGERPRINTING**: The technique of DNA fingerprinting is used to uniquely characterize individual organisms, foods, or biological samples, based on their DNA composition (can also fingerprint chemicals and proteins). (DM+GK)

**FIQH**: The science of Muslim religious law or Islamic jurisprudence. The first scholar to write a treatise on Fiqh was Shafi'i (d. 820). Four main schools of Muslim law have survived to modern times among the Sunni. These are: Hanafi, Hanbali, Maliki and Shafi'i. Each of these is regarded as equally valid by Orthodox Muslims. The Shi'i have their own systems of Muslim law. (AG)

**FIREWALL**: A protective layer of software to protect a corporate intranet or private citizen from access by outsiders, hackers or the Internet at large. Firewalls monitor in- and out-going traffic and may consist of multiple layers of security software, authentication services, packet filters, one-way connections, encryption programs, tunnel servers and application proxy firewalls. (See INTERNET PRIVACY, INTRANET) (MP)

**FIRST WORLD**: Slightly condescending term for the developed nations, or wealthy North. The first world includes Europe, North America, Japan, Australia and New Zealand, and sometimes including industrialized countries like Singapore and Taiwan, democratic states like Israel and South Africa, and/or emerging capitalist economies such as Russia. The wisdom of being first depends on what's ahead and what you leave in your wake. In many respects the First World may be *over* developed, requiring demilitarization, dematerialization and more responsible ethical standards for custody of the global environment. (See FOURTH WORLD, THIRD WORLD, SECOND WORLD, NORTH, DEVELOPMENT, DEVELOPED NATIONS, OVERDEVELOPED NATIONS, ENVIRONMENTAL CODE OF CONDUCT, DEMILITARIZATION, DEMATERIALIZATION) (MP)

**FIRST WORLD NATIONS:** Countries belonging to the so-called FIRST WORLD.

**FISH :** 1. a common term that refers to aquatic animals. 2. Several classes of aquatic vertebrates generally characterized by poikilothermy (cold-blooded), gills, fins, and a streamlined body. Among extant taxa, these include the teleost fishes (Sarcopterygii lobe-finned fishes and other vertebrates; and Actinopterygii ray-finned fishes) and the Chondrichthyes the sharks, rays, sawfish, and chimeras; and the more primitive lampreys (Hyperartia) and hagfishes (Hyperotreti). (RW)

**FISHER :** 'Fisher' is replacing 'fisherman' as a gender-neutral term describing a person occupied with the task of catching fish. (MP)

**FISHING PRACTICES:** (See COASTAL ZONE MANAGEMENT)

**FISHING QUOTA :** The fishing or vessel quota is a sustainable fisheries management method for allocating fishery property rights and sharing the 'total allowable catch' among rightful fishing parties. Fishing quotas may be transferable, seasonal, area-specific, species-specific and/or enforceable by law. (See QUOTA, TOTAL ALLOWABLE CATCH, THRESHOLD MANAGEMENT) (MP)

**FIVE ELEMENTS:** In traditional Chinese belief, the world is composed of five elements: water, fire, wood, metal, and earth. In addition to the elements themselves, the way in which they interact with each other is very important, and this plays a role in traditional Chinese medicine and astrology. In the traditional Chinese calendar, each year is assigned an animal and an element. There are 12 animals and 5 elements, and so, all the possible combinations are exhausted after 60 years, when a new cycle of years begins. For this reason, the 60th birthday in Chinese tradition is very significant. (AG)

**FIVE RELATIONSHIPS:** The relationships in Confucius' teaching which define inter-personal relations in society. The five relationships are: relationship between a father and son, ruler and minister, husband and wife, elder brother and younger brother, friend and friend. This framework defined by Confucius had profound impact upon the countries and cultures of East Asia. (AG)

**FLAGELLA:** Long hair-like structures on a cell or microorganism enabling movement or manipulation. (See CILIA) (MP)

**FLEMING, ALEXANDER:** (1881-1955) Sir Alexander Fleming was a Scottish-born bacteriologist who studied and worked at St Mary's Hospital, London. He was a pioneer in vaccines, antiseptics and antibiotics, being the first to use Nobel Prize for Physiology or Medicine with his collaborators in the isolation of penicillin, Sir Erns8). (See ANTIBIOTIC) (MP)

**FLORA :** The community of all plants living in a place. Fauna and flora was traditionally used to refer to all organisms living in a place, but technically this would not include fungi, protists, bacteria, and archaea. (RW)

**FLOTSAM :** 1. Any accumulation of semi-useless or discarded bits and pieces. 2. Washed-up or floating wreckage of ships, stray cargo, driftwood and other interesting sea-wreckage. (See JETSAM) (MP)

**FLOWER:** Flowers are the reproductive structure of angiosperm plants, comprised of protective sepals, colorfully attractive petals, the female pistil with stigma, style and ovary, and the male stamen with filament and anther. The beauty of the flower has made it a much-loved symbol of peace and romance. (See FLOWER POWER, ANGIOSPERM) (MP)

**FLOWER POWER:** The 'love thine enemy' concept of non-violent interaction with security forces, epitomized by the hippy culture and anti-war movement. (See HIPPIES, PEACE MOVEMENT) (MP)

**FLOWS:** See PROCESSES.

**FODDER:** Anything given on farms or sold for non-human animal consumption. Compare FOOD. (DM)

**FOLIC ACID** is a vitamin of the B complex group essential for cell growth and reproduction. The need for folic acid increases in pregnancy, infancy and periods of stress where a daily intake of 400 mg before conception and during early pregnancy lowers the risk of fetal neural tube defect (see spina bifida). Rich dietary sources are deep green leafy vegetables such as spinach, liver, beans, nuts and whole-grain cereals and bread (see SPINA BIFIDA). (IP)

**FOLLICLE:** The structure on the ovary surface that nurtures a ripening oocyte. At ovulation the follicle produces estrogen until the oocyte is released, after which it becomes a yellowish protrusion on the ovary called the corpus luteum. (DM)

**FOOD:** Anything consumed or sold for human consumption. Compare FODDER. Food can also be any substance consumed by living organism. (DM)

**FOOD ADDITIVE:** A minor usually synthetic ingredient added to food to achieve a specific effect. In law, some of these compounds are legally excluded from being called this term for the purposes of food safety regulation. (DM)

**FOOD AID:** Food Aid is internationally distributed humanitarian famine relief and emergency food assistance, for example from non-government organizations (NGOs) or the UN's Food and Agriculture Organization (FAO) and World Food Programme (WFP). Food aid should be deployed directly to where it can save lives, independent of economy. It should be taken that food is not redirected to the wealthy or the armed forces. Care should be taken not to undercut local markets or encourage a handout economy. Notant, and some African countries have rejected genetically modified foods. Food aid should include local capacity building in agriculture and technology, development-reliance and long term food security. (See FOOD CRISIS, FAMINE, NUTRITION, CAPACITY BUILDING) (MP)

**FOOD CHAIN:** = energy transfer from plants to top carnivore through a few intermediary organisms- the act of repeated eating and being eaten. (JA)

**FOOD CRISIS:** A state of emergency in which populations are at risk of death, disease and panic due to dire shortages of food (i.e. famine) or food contamination (e.g. BSE outbreak). (See FOOD AID, FAMINE, MALNUTRITION, WATER CRISIS, BOVINE SPONGIFORM ENCEPHALOPATHY) (MP)

**FOOD AND DRUG ADMINISTRATION (FDA):** a US-based agency within the Department of Health and Human Services established to set safety and quality standards for foods, drugs, cosmetics and other household consumer products. The FDA's basic tasks are research, inspection and licensing of drugs and food-stuffs for manufacturing and distribution. (IP)

**FOOD WEB :** The conceptual web of food connections between organisms in an ecological community. Primary producers create organic matter and are eaten by grazers (herbivores), which are in turn eaten by carnivores. Formerly, this was called a food chain, but recognition that such links are often nonlinear lead ecologists to change this to food web. (See TROPHIC INTERACTIONS, AUTOTROPH, HETEROTROPH) (RW)

**FORCE FEEDING** : Coercive feeding, usually artificial feeding. (DM)

**FORENSIC DNA ANALYSIS** : Powerful tool for identification of individuals in forensic cases. The DNA analyses are performed on semen, blood stains, hair roots or any other biological evidence. Different DNA polymorphic regions can be analysed: VNTRs, STRs, mitochondrial D-loop region (mtDNA replication region). Current techniques involve automated fluorescent detection of multiplex sets, consisting of a group of STRs differing in size profiles, that are co-amplified and separated on polyacrilamide gels and read on automatic laser beam analysers. (GK)

**FORENSIC MEDICINE**: The application of medical knowledge to questions of law and law enforcement. (See DNA FINGERPRINTING, FORENSIC PSYCHIATRY). (DM)

**FORENSIC PSYCHIATRY** : The application of psychiatric knowledge to questions of law and law enforcement. (DM)

**FORENSIC SCIENCE**: An applied trans-disciplinary science to study criminal and social behaviour with the application of biological, biochemical and physio-chemical techniques. E.g. use of DNA finger printing to determine the human identity with a victim, the time of murder inferring the patterns of breeding in insects. (JA)

**FOREST**: Large area of land dominated by trees. Massive deforestation has taken place in many countries to the extent that in only South America and Africa were there significant amounts of native forest left at the start of the twenty first century, and these were rapidly being removed. The full ecological consequences of widespread deforestation are still unknown but certainly include soil erosion and probably include significant, undesirable and difficult to reverse climate change. (MR)

**FORMALISM** a deontological (from Gk *deon* meaning duty) ethical system where the theory holds that an action is right if it accords with a moral rule, and wrong if it violates such a rule.

**FOSSIL FUELS** : Fuels derived from the fossilized remains of plants and animals. For example, coal is the remains of primeval forests; petroleum and natural gas are the remains of prehistoric animals and plant; peat is partly decayed plant matter in an early stage of coal formation. Fossil fuels are precious non-renewable resources. (See SUSTAINABLE DEVELOPMENT, GREENHOUSE EFFECT). (IP)

**FOSSIL RECORD** : (Latin *fossus* 'dug up'). Objects such as the remains or traces - like foot prints, burrows, trails referred to as 'trace fossils' - of fauna and flora which have been embedded, typically, in shale or sandstone which prevented their decay. Since fossils prove the previous existence of extinct organisms, the fossil record lends strong support for the theory of evolution, and is also useful to the geologist in revealing former environmental conditions in geological time (geochronology). The presence of certain fossils can be used as a guide to the relative age of the rock stratum or bed in which it is found; that is, to correlate the sequence of stratified formation in different parts of the world. (See FOSSIL FUELS, EVOLUTION). (IP)

**FOUNDER EFFECT**: Evolutionary adaptation and speciation which results in rapid change (punctuated equilibrium) due to sudden mass mortality or genetic partitioning, for example geographical separation, natural disasters or other evolutionary bottlenecks. (See SPECIATION, PUNCTUATED EQUILIBRIUM, NATURAL HAZARD, MASS EXTINCTION, EVOLUTION) (MP)

**FOUR FREEDOMS** : Peace objectives which were enunciated in 1941 by Franklin Roosevelt during the Second World War when the US Government was playing a major diplomatic role, in his 1941 'Four Freedoms' speech. The well-known four freedoms are '*freedom of speech*',



*'freedom of worship', 'freedom from economic want' and 'freedom from aggression'.* Nowadays a fifth freedom can well be added - *'freedom from excess fertility'*. (See FREEDOM). (IP+MP)

**FOUR NOBLE TRUTHS:** Philosophical teachings of the enlightened Buddha: 1. life has omnipresent suffering; 2. suffering involves a chain of causes including desire and selfishness; 3. suffering can be removed by removal its causes such as desire; and 4. there is a path towards this end (the 'Eightfold Path'). (See EIGHTFOLD PATH, MIDDLE WAY, BUDDHISM, BUDDHA) (MP)

**FRAMESHIFT:** Mutation that results when the genetic code is read beginning at the second or third base of a codon. (DM)

**FRANKENSTEIN FACTOR:** Dr Frankenstein is the character in Mary Shelly (died 1851)'s novel of the same name who creates a monster whom he is unable to control. In the 1990s the term 'The Frankenstein factor' became used to refer to a widely felt fear that GENETIC ENGINEERING (q.v.) and other instances of modern BIOTECHNOLOGY (q.v.) would lead to unanticipated and irreversible harms. (MR)

**FRATERNAL TWINS:** See Twins/Twinning.

**FRAUD :** The act of deliberately misrepresenting or inventing information in order to gain personal advantage like wealth, fame. (IP)

**FREE MARKET:** An economic system (or lack of system) in which uncontrolled competition rules, only the fit (in terms of success in marketing goods, services, or one's own body, survive, and the main motive is profit. The profit may be money, or material goods or food (as may be observed when chickens fight over a piece of food). Or it may be pride, honours, fame or the like. Many people have been convinced that the fall of the Soviet Union was proof of the evils of socialism and the gospel truth of free market ideology, although there may have been other causes such as subversive activity on the part of Western countries. (FL)

**FREE MARKET MEDICINE:** An ideology which encourages the profit motive in medicine. An extreme version would allow for people to be treated only if they have the ability to pay, although some doctors in such an environment might be willing to treat some people for free if it serves some research purpose. Medical systems which began with an ideology of universal, egalitarian medical care, such as the National Health Service in the United Kingdom and the Sick Funds in Israel, now are mixed with varying degrees of free market medicine in the form of private clinics, fee charging for special treatment on the part of physicians even during their work hours in the national medical system, and high prices (or special insurance policies) for certain treatments and medications, such as expensive drugs, certain kinds of preventive medicine, immunizations for foreign travel, etc: with competition among providers for offering the most attractive insurance packages. It can be debated whether a physician in a free market system can adhere to all of the recognized principles of bioethics, especially the principle of beneficence. For it is questionable whether a physician can act entirely for the benefit of the patient if the patient's ability to pay determines the quality and quantity of treatment. (FL)

**FREEDOM:** The absence of external constraints on the individual's right and ability to act and make decisions. (DM)

**FRESHWATER :** Water that is not salty. As an adjective, of, relating to, or living in water that is not salty. Potable (drinkable) freshwater is one of the most critically limiting resources for many human communities; the number of people living with water scarcity is already large and is expected to increase rapidly in the coming decades in many parts of the world. (RW)

**FREUD, SIGMUND :** (1856-1930). Austrian physician and pioneer of psychoanalysis. Freud's major contribution can be broadly summarized as the exploration of the unconscious mind and his coining of the term 'id' to define the true unconscious representing the individual's self-

preserving tendencies and instincts. Freud claimed that interpretation of dreams is an important factor in psychoanalysis. By studying the dreams of his patients, Freud crystallized his theory that nearly all cases of neurosis were due to repression of sexual desires. His theory was published in the influential text *'Three Treatises on the Sexual Theory'* in 1905. Freud's influence in the 19-20<sup>th</sup> centuries cannot be underestimated as almost every branch of thought, particularly in education, was affected by the theories of psychoanalysis. (See DREAM). (IP)

**FRIENDLY FIRE:** Euphemistic term describing ammunition or explosives inadvertently causing injury or death to soldiers and personnel from the same military alliance. (See COLLATERAL DAMAGE, EUPHEMISM) (MP)

**FRINGE-DWELLERS** inhabitants of shanty towns living on the edge of mainstream society and, typically belonging to minority or ethnic groups bound by poverty and marginalization. (IP)

**FROG EXTINCTIONS:** See EXTINCTION, ENDANGERED SPECIES.

**FRONTAL LOBE OR PREFRONTAL CORTEX** that part of the cerebral hemisphere which houses the will to initiate planning make purposeful use of the imagination and solve problems by reasoning. (See LEUKOTOMY) (IP)

**FRONTAL LOBE LOBOTOMY:** See LEUKOTOMY.

**FROZEN:** See DEEP FREEZING.

**FUNGAL TOXINS :** The fungi *Fusarium* can produce a toxin known as deoxynivalenol or DON. Fungal infection of food-crops (such as wheat) can harbor DON. Unfavorable weather conditions can strongly influence the concentration of DON in wheat. In animals, exposure to high concentration of DON has adverse effect on the immune system, fertility and in embryo development. (JA).


**FUNGI:** One of the five taxonomic kingdoms (along with Animalia, Plantae, Protista and Monera), the Fungi are a diverse group of heterotrophic organisms with a rigid cell wall. Lacking chloroplasts, the fungus obtains its nutrients from mineral absorption through its hyphae and mycelium. Fungi perform an important ecological function as decomposers. Fungi include mushrooms, toadstools, bracket fungi, lichens, water molds and unicellular organisms and range from edible to poisonous. (See LICHEN, DECOMPOSE, PSILOCYBIN, PLANTAE) (MP)

**FUSARIUM :** See FUNGAL TOXINS.

**FUTILITY :** The uselessness of medical intervention in preventing a patient's death. (DM)

**FUTURE 500** is a network of people and companies aiming at forging a new knowledge-based economics that can expand the capacity of the human mind. In 1998 Kiuchi, chair of "Future 500", introduced three new categories into company's accounts - pollution intensity, resource productivity, and quality of life. (IP+Dm tocheck)

**FUTUROLOGY:** Scientific study and prediction of future trends, and projections of technological progress, environmental change and the future human condition. Some classic works of futurology have included Alvin Toffler *'Future Shock'* (1970), Club of Rome *'Limits to*

*Growth*' (1972), K. Eric Drexler *Engines of Creation*' (1986), Marvin Minsky *Mind Children*', Michio Kaku *Visions*' (1998), Lee Silver *Remaking Eden*' (1998) and Frank Tipler *Physics of Immortality*'. Futurologists have traditionally been somewhat optimistic in their time-frames (e.g. George Orwell ' ), but the accelerating pace of change will bring current technological predictions more rapidly. New and dangerous spaces of possibility have recently been opened up by new advances in genetic engineering, genetic medicine, cloning, cybernetic nerve-computer interfaces, cyborgs, organization of cyberspace, artificial neural networks, networked sensor arrays, smart dust, miniaturization of robotics, autonomous weapons, molecular electronics, nanotechnology, and evolutionary approaches to artificial life. Insight into single-technology possibilities has grown rapidly, however professional specialization has not allowed for proper consideration of their potentially dramatic impacts in combination. Success rates can be patchy if projected too far into the future along assumed curves which may be subject to sudden or unexpected interferences. This significance may be crucial to human survival and wellbeing, and despite skepticism, futurology is an essential and underrated component of dealing with the progress of ethically fraught technologies. (See ACCELERATING PACE OF CHANGE, ESCHATOLOGY, TECHNOLOGY, SCIENCE FICTION, HUMAN EXTINCTION, UTOPIA) (MP)

**FUZZY LOGIC:** The operations and mathematics of 'fuzzy sets' and 'fuzzy systems'. Unlike the constancy of classical sets, fuzzy sets have varying membership of the set. Fuzzy logic is a recognition of the 'degrees of gray' and 'fuzziness' inherentCS, UNCERTAINTY) (MP)

## G

<a href="#">A</a>	<a href="#">B</a>	<a href="#">C</a>	<a href="#">D</a>	<a href="#">E</a>	<a href="#">F</a>	<a href="#">G</a>	<a href="#">H</a>	<a href="#">I</a>	<a href="#">J</a>	<a href="#">K</a>	<a href="#">L</a>	<a href="#">M</a>	<a href="#">N</a>	<a href="#">O</a>	<a href="#">P</a>	<a href="#">Q</a>	<a href="#">R</a>	<a href="#">S</a>	<a href="#">T</a>	<a href="#">U</a>	<a href="#">V</a>	<a href="#">W</a>	<a href="#">X</a>	<a href="#">Y</a>	<a href="#">Z</a>
<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**GAIA:** The Greek goddess of the Earth; 2. an hypothesis proposed by James Lovelock that posits the Earth behaves as a super-organism with multiple feedbacks among organisms and physical processes regulating climate and Earth surface conditions to within a relatively narrow range conducive to life. Lovelock is an English atmospheric scientist, who presented in 1969 his revolutionary Gaia hypothesis - a hypothesis still the subject of considerable scientific interest and debate (see GAIA HYPOTHESIS). (IP+RW)

**GAIA HYPOTHESIS** the Gaia theory of the Earth is a post-Darwinian evolutionary theory, which posits a set of homeostatic mechanisms as devices for self-maintenance of the Earth's environment. In other words, instead of passively riding the planet, living things became fully-fledged symbiotic partners in the shaping of the Earth, its allenges the reductionist view of the world by proposing that the world is one living system where living things transform each other in ways that actively maince of life. The essence of this proposition is that the physical and chemical conditions of the surface of the earth, the atmosphere and the oceans, are conti by the presence of life itself. This view is in direct

challenge to the conventional Darwinian wisdom which holds that life adapted to the existing planetary theory is supported to the extent where it can now be demonstrated, with the aid of numerical models and computers, that a diverse web of predators and prey faystem than a few more self-contained species, or a shorter food chain of very limited mix. Colloquially, the sum of a series of complex systems (biodiversity) han the sum of its parts. What becomes immediately evident is that the Gaia hypothesis is a powerful challenge to our ethnocentric view of the world and, if inct as one, we have to reassess our environmental responsibilities in this context. We have to take care not to violate the principles of sustainability which a global commons of air, water and soil; we have to become fully participating partners within ecosystems where diversity, not unity, is the basis of health (see ANIMISM & BIOGEOCHEMICAL CYCLE).(IP)

**GAME THEORY:** ‘Game theory’ is the stu games of chance, strategy games and war gaming. Standard game theories include ‘chicken’, ‘prisoner’s dilemma’ and ‘minimax’, and military game theories include ‘STAGE’ (‘Simulation of Total Atomic Global Exchange’) or the US Army’s ‘TACSPIEL’ (divisional tactics) and ‘AGILE’ (counter-insurgency). The ‘game’ is defined by the rules governing moves, examples including conflict, coordination, cooperation, coalition and positive-sum games. ‘Game theory’ is a scary term in some ways, in a world where actors treat internet, economic and military affairs as a big ‘game’ whilst safely shielded from the real-life consequences of their actions. (See STRATEGY, HEURISTICS, FUZZY LOGIC, BOOLEAN LOGIC, UNCERTAINTY, PRISONER’S DILEMMA) (MP)

**GAMETE INTRAFALLOPIAN TRANSFER (GIFT):** A technique of medically assisted conception in which mature oocytes are surgically removed from a woman's body and then reintroduced, together with sperm, through a catheter threaded into the fallopian tubes, where it is hoped fertilization will take place. (IP)

**GAMETE:** Mature male or female reproductive cell with a haploid set of chromosomes (in humans there are 23 chromosomes); that is, a sperm or ovum. (IP)

**GAMETOPATHY** disease of gametes (sperm and eggs) resulting in physiological disturbances (Gk *gamos* meaning marriage and *pathos* meaning disease). (IP)

**GANJA :** See MARIJUANA.

**GATT** abbreviation for "general agreement on trade and tariffs" aimed at reducing border barriers and restrictions. Also called free trade agreement and is opposed to protectionism. (IP)

**GDP:** See GROSS DOMESTIC PRODUCT.

**GEEP :** Animal (strictly a **CHIMERA** (q.v.)) formed by fusing together Goat and shEEP cells. (MR)

**GENBANK :** An organization located in Alamas, USA which is repository of DNA sequence databases. (See BIOINFORMATICS) (JA)

**GENDER :** (Latin *genus* 'kind') the classification of the sex of a person roughly corresponding to masculine, feminine, ambivalent or neuter according to the demonstration of the continuum from maleness to femaleness. (See SEX; HOMOSEXUAL; TRANSSEXUAL). (IP)

**GENE:** The fundamental physical and functional unit of heredity. A gene is an ordered sequence of nucleotides located in a particular position

on a particular chromosome. Length of the triple code in DNA - determines the sequence of amino acids in a protein. (See GENE EXPRESSION). (DM, JA)

**GENERALIZATIONS:** Applicability to other broader situations, beyond the specific research design, and across a diversity of different systems. Generality or a generalization implies a common theme or average measure of similarity across a range of subjects, and indicates the breadth of relevance of certain processes, philosophical ideas or research. 'General knowledge' refers to common wide-ranging knowledge, but with facts readily accessible in academic literature and the internet, today a 'generalized' education IDISCIPLINARY) (MP)

**GENERIC DRUGS:** 1. where the name of a particular drug also describes its chemistry; such as penicillin or tetracycline 2. pertaining to a substance, product or drug that is no longer protected by trademark and where this product, identical or closely related to the original, is placed on the market by a manufacturer other than the holder of the original patent. No new clinical trials are required by the new supplier as it is assumed that the generic drug is safe and effective; thus, typically, these drugs cost a fraction of the original price. Generic drugs are also called "me-too" drugs (Latin *genus* kind). (IP)

**GENETIC CODE:** The sequence of base pairs in DNA providing information to form proteins. (DM)

**GENE CONSTRUCT :** A gene sequence prepared under laboratory conditions for transgenic transfer where the desired characteristics will be expressed. (JA)

**GENE CHIP:** An array of probes of nucleic acid on a chip for rapid assays of genetic variation, and mutated DNA sequences in an organism. Gene chips may allow for the diagnosis of all the genes of a genome in one test, and analysis is done by computer technology. (DM)

**GENE DIAGNOSTIC TESTING :** The presence of a faulty gene can be detected by techniques using the results on the gene structure e.g. association of BRCA1 with breast cancer. (JA).

**GENE EXPRESSION:** The process by which a gene's blueprint is converted into the structures present and operating in the cell. Expressed genes include those that are transcribed into mRNA and then translated into protein and those that are transcribed into RNA but not translated into protein (e.g., transfer and ribosomal RNAs). Appearance of a phenotypic characteristic specified by a gene like the shape of a fruit/color of a seed (DM, JA)

**GENE FAMILIES:** Groups of closely related genes that make similar products.

**GENE GUN** - a method for introducing foreign particles or genes into cells. The accelerating particles have a diameter sufficiently small to penetrate the surface membranes and be retained in a preselected cell without killing the cell. The idea is for the gene to be functionally incorporated into the interior of the cell without disrupting normal gene sequences (see GENE THERAPY). (IP)

**GENE KNOCKOUT :** An organism that has been genetically modified so that one gene is knocked out, or dysfunctional, for use in biomedical research of gene function. (DM)

**GENE PATENTING:** There has been controversy over the issuance of patents to nucleic acid sequences, and article 4 of the Universal Declaration on the Human genome and Human Rights, approved by all members of UNESCO in 1997 states "The genome in its natural state shall not be patented". In considering DNA as an asset or a property the following three arguments have been raised in a Nuffield Bioethics Council Report. 1. "Patents that assert rights over DNA sequences, in particular human DNA sequences, should not be allowed by virtue of the special status es should not be allowed because they do not meet the legal criteria for patenting. 3. patents that assert rights over DNA sequences shounces for healthcare and research related to healthcare." (JA, DM)

**GENE POOL:** The sum total of all the different GENES (q.v.) and forms of genes (ALLELES (q.v.)) found in a POPULATION (q.v.) or other collection of organisms within a SPECIES (q.v.). So the gene pool contains all the genetic variation found among the organisms in question. (MR)

**GENE PRODUCT:** The biochemical material, either RNA or protein, made by a gene. The amount of gene product is used to measure how active a gene is; abnormal amounts can be correlated with disease-causing genes. (DM)

**GENE THERAPY :** Used without qualification means the genetic modification of body cells of an individual patient, directed to alleviating disease in that patient. See somatic gene therapy and germ line gene therapy. (See SOMATIC-CELL GENE THERAPY; *IN UTERO* GENE THERAPY) (JA)

**GENE TRANSFER** refers to the spread of genetic material through natural genetic mechanisms. Little is known about the frequency of genetic exchange in Nature. Recent concerns are about outcrossing to wild varieties of genetically engineered plants and risk of transfer of foreign DNA across to insects, birds and mammals which normally consume some parts of the genetically modified organism and its long-term impact on those species (see GMOs) (IP)

**GENERA :** Plural term for genus. (See GENUS).

**GENERAL ADAPTATION SYNDROME (GAS):** was first described by Canadian physician Hans Selye in 1956 and describes the link between stress (whether physical or psychological) and nervous-hormonal activation resulting in the release of adrenaline (also called the fight-or-flight reaction), cortisol and other hormones involved in the emergency feedback loop to changing environmental influences. Since the hypothalamic-pituitary-adrenal axis is involved in the homeostatic adaptation to environmental and metabolic change, stress is necessary for continued adaptation, and in non-threatening situations is also the spice of life. Stress is harmful only when it's prolonged and ineffective where it can lead to degenerative conditions such as cardiovascular disease. Biologically, the essential thing is that the body must be prepared for changing circumstances by the initiation of an appropriate GAS response (see DISEASES OF ADAPTATION, STRESS, POST TRAUMATIC STRESS DISORDER; EUSTRESS; DISTRESS). (IP)

**GENERATION :** 1. Production, reproduction; the process of bringing something into being (e.g. the conception of offspring). 2. People in a social demographic having approximately the same age, perhaps also correlating with a certain outlook or attitude (e.g. the grandparent's generation). 3. A successive period in the reproductive evolution of a family lineage (e.g. about 35 years for humans). A generation is best measured not as the age of first breeding, but as the average age of the active parents in a population. (See GENERATION GAP, GENESIS) (MP)

**GENERATION GAP :** 1. The average length of time between successive generations of a population. 2. Perceived differences in the attitudes,

opinions, behaviors and concerns of successive generations. The generation gap is created by shifts in philosophical frame of reference between age groups which have grown up in divergent avenues of social, cultural and technological evolution. This age barrier may be broken down using communication, curiosity and tolerance, and the avoidance of age-related habitual patterns and ingrained belief systems. (See GENERATION) (MP)

**GENESIS** : (Greek: *gignesthai* 'to be born') 1. Origin, first beginning. 2. The first book in the Old Testament of the Holy Bible of the Judeo-Christian faiths. The Book of Genesis begins with divine creation (Genesis 1.1: "In the beginning God created the heavens and the earth"), including the first humans Adam and Eve, created in God's image but banished from the Garden of Eden for eating from the tree of knowledge of good and evil. (See OLD TESTAMENT, TORAH, ORIGINAL SIN) (MP + JA)

**GENERAL AGREEMENT ON TRADE AND TARIFFS** : See GATT.

**GENERAL THEORY OF ADAPTATION**: See STRESS.

**GENETIC**: Connected with the genetic system of heredity, e.g. Genes. (JA)

**GENETIC ABNORMALITY** : Due to mutation, a gene/or a protein is altered in such a way that the gene expression is altered and the protein is unable to function normally. There are about 5,700 known genetic abnormality and genetic testing can reveal the disorder in about 300 cases. (JA)

**GENETIC ALGORITHMS**: Genetic or evolutionary algorithms, pioneered by John Holland, are sets of computer instructions which emulate aspects of evolution and genetic biology such as self-organization, replication, heredity and adaptation to their environment. Genetic algorithms form the basis of programming which emulates life as part of the 'bottom up' approach to artificial life, along with cellular automata and artificial neural networks. (See ARTIFICIAL LIFE, ARTIFICIAL NEURAL NETWORKS, CELLULAR AUTOMATA, ALGORITHM) (MP)

**GENETIC CODE**: The sequence of nucleotides, coded in triplets along the mRNA, which determines the sequence of amino acids in protein synthesis (e.g. UGC = cystine). The DNA sequence of a gene can be used to predict the mRNA sequence, and the genetic code can in turn be used to predict the amino acid sequence. Universal, common in all living organisms. (DM, JA)

**GENETIC CONSULTATION** : The purpose of genetic consultation is to deal with issues that relate to the suitability of the test for caring an individual person's concern, such as the interpretation of the result and to arrange a clinical referral, should that prove necessary, proving appropriateness of genetic consultation will vary for each genetic test. It should include taking a family history and those elements of genetic so discussion of reproductive options where relevant and management plans for the patient and the family in a sensitive, objective and "non directive " way. (JA)

**GENETIC COUNSELING** : A process of consultation by which information is imparted to individuals or families affected by or at risk of a genetic disorder. It includes information on the nature of the disorder; the size and extent of genetic risks, the options, including genetic testing, that may help clarify the risks; the available preventive and therapeutic measures and the provision of psychological, social and practical support. In the context of genetic testing it may include responding to the concerns of individuals referred and their families,

discussing the consequences of a test and enabling them to choose the optimal decision for themselves but not determining a particular course of action. (JA)

**GENETIC DETERMINISM:** Doctrine or theory that the genetic make-up of an individual absolutely characterises (i.e. determines) its appearance (i.e. PHENOTYPE (q.v.)). Strictly, the theory is entirely invalid in that a sufficient change in the environment (e.g. the absence of any water) is sufficient to prevent the phenotype being observed (in the case of the absence of water, because the organism will have died). However, the theory is of use in that certain characteristics, e.g. natural iris colour in humans, have a much stronger genetic component to them than do certain other characteristics, e.g. language spoken. At the same time, certain phenotypes which might be thought to be 'genetically determined', e.g. the 'genetic disease' of PHENYLKETONURIA (q.v.), can be almost entirely avoided by appropriate changes in the environment, i.e. childhood diet in the case of phenylketonuria. (MR)

**GENETIC DIAGNOSIS :** See PRENATAL DIAGNOSIS, PREIMPLANTATION GENETIC DIAGNOSIS.

**GENETIC DISEASE :** Afflictions which are due to defects in the genetic endowment of a person. They may be the direct consequences of defects in single genes; or in whole chromosomes, part of which may be lost, duplicated or misplaced; or due to the interaction of multiple genes and external factors in fetal development. Later in life such interactions appear to be the basis of many of the common serious disorders, such as heart disease, diabetes and cancer. (see GENETIC DISORDERS, DISORDER GENETIC) (JA)

**GENETIC DISORDER :** A malfunction or a disability caused due to a genetic factor, which results in the manifestation of human diseases. E.g. a). phenylketoneuria b). Congenital hypothyroidism c). Haemoglobinopathy. See GENETIC TESTING OF NEW BORN, MONOGENIC DISORDERS AND MULTI FACTORIAL DISORDER. (JA)

**GENETIC DIVERSITY:** One of the three diversities in the biosphere (habitat diversity, biodiversity, genetic diversity) Indicates the enormous variety of genes - DNA sequence- found in organisms In humans there are about 100,000 genes and in plants 80,000 genes. Totally about 10 to the power of 9. (JA, IP)

**GENETIC ENGINEERING :** Altering the genetic composition of a living organism by technological means based on recombinant DNA technology. This can be altering the gene sequence, addition, substitution, deletion, avoids natural mating and occurrence of natural genetic recombination during meiosis. Has contributed to the understanding of genetic diversity useful in the conservation for plants, animals and microorganisms. An umbrella term, powerful tool for manipulating genetic material of any organism for making GMOs, gene therapy. Useful in biotechnological industry. Also known as targeted genetics, recombinant DNA, manipulation (see BIOTECH AND BIOTECHNOLOGY). (DM, JA)

**GENETIC ENGINEERING APPROVAL COMMITTEE (GEAC)** A Competent authority of the Department of Environment, Forest and Wildlife for approval of activities involving large scale use of hazardous microorganism and recombinant in research and industrial production from the environmental angle. The committee shall also be responsible for approval or proposals relating to the release of genetically engineered organism and products into the environment including experimental field trials. (JA)

**GENETIC EPIDEMIOLOGY:** the study of the distribution of disease in groups of relatives and ethnic populations and the identification of the genes responsible. Many diseases have both genetic and environmental components and a particular genetic defect may increase a person's susceptibility to disease and its expression mayd culturally similar ones, in order to identify the susceptibility genes for common disease states (see EPIDEMIOLOGY; GENETIC SUSCEPTIBILITY). (IP)



**GENETIC FREEDOM** : Phrase coined by Darryl Macer in 1990. The freedom to bring about the conception of a child with any characters, be they good or bad, desired or undesired. Genetic freedom should be protected from influences that limit choices, within the framework of a healthy life. (DM)

**GENETIC HAEMOCHROMATOSIS** : is a genetic condition, where recessive condition the gene defects identified occur relatively frequently in the population at large but the number of individuals affected with clinical symptoms is low since many people with the gene defect do not go on to develop the condition. (JA)

**GENETIC INFORMATION**: A person's genetic information can be obtained by genetic testing, physical examination, from the records of past medical interventions/treatments and by a person's genetic status. Officials in health care profession, in health care institutions, researchers, employers, insurance company, legal/law enforcement autha person. (JA)

**GENETIC INTERVENTION** : General term for the modification of inheritable characteristics of individuals or populations through various social mechanisms and/or biomedical technologies. (DM)

**GENETIC LINKAGE MAP**: A map of the relative positions of genetic loci on a chromosome, determined on the basis of how often the loci are inherited together. Distance is measured in centimorgans. (DM)

**GENETIC MATERIAL**: The genetic material contain in a nucleus of an organism, commonly referred to as the Genome where the DNA contains the blue print for genotypic and phenotypic expression of an organism. The chromosome contains the DNA and the DNA the genes. The complex set up which is concerned with heredity. (JA)

**GENETIC MODIFICATION** : Modifying the genetic makeup of an organism with direct transfer of a foreign gene. (JA+PW)

**GENETIC REGISTER** : A computer based system of storage of genetic information of people, subject to Data Protection Act. Access restriction to only those specifically responsible for the register. (JA)

**GENETIC SCREENING**: Analysis of a cohort of genotypes for the presence or absence of a particular DNA sequence, or gene. To examine total population to assess the prevalence, pattern of disease spread of a genetic disease. (DM, JA)

**GENETIC STATUS** : It indicates the genetic condition of a person whether there are any genetic abnormality in a person. Three types of genetic status may be recognized. (i) a monogenetic condition in which a gene if present or absent may create a genetic condition which may be expressed or presymptomatic in nature. (ii) When a trait is controlled by one or more genes different types of environmental stimuli may induce difference gene response. E.g a mutation which lacks enough power to induce a phenotypic expression. (iii) a person may carry one defective copy of a gene but the healthy copy of a gene may dominate and the person may not suffer any ill effect. (JA)

**GENETIC SUSCEPTIBILITY**: A genetic risk for developing a disease. The disease may be simple or complex, and the chance of actually getting the condition or disease ranges from 1-100% between genes and individuals. (DM)

**GENETIC TEST** : Genetic testing is a part of diagnosis in pediatric practice. Tests that are carried out to detect the presence or absence of, or change in, a particular gene or chromosome, or a change in a gene product, in relation to a genetic disorder. There are a number of tests such as Diagnostic Genetic Testing, Presymptomatic Genetic Testing, Susceptibility Testing and Carrier Testing. (JA)

**GENETIC TESTING OF NEW BORN** : New born human beings are being tested in most industrialised countries, for the following

genetic disorders: a).phenylketoneuria, b) Congenital hypothyroidism, c) Haemoglobinopathy, d) Galactosemia, e) Maple syrup urine disorder, f) Haemocystinuria, g) Biotinidase deficiency, h) Tyrosinemia, and recently confirmed, facilities for further treatment should be made possible. Parental guidance is recommended. (JA)

**GENETIC THERAPY** : See GENE THERAPY.

**GENETIC TRANSFER** : Artificial transfer of gene, unrelated/synthetic DNA into another species. (JA)

**GENETIC VARIATION**: The way in which different organisms within a species (or between species) have different DNA sequences, and allelic variation in their genes. (DM)

**GENETIC MODIFICATION**: The process of transfer of genes across organisms irrespective of taxonomic distinctions e.g. from Plant to animals- microorganism- human beings. (DM)

**GENETICS**: A branch of biology dealing with genes, variations and heredity. Gregor Mendel is considered the father of Genetics. The science of the inheritance of characteristics. The term 'genetics' was coined by William Bateson in 1905, five years after Mendel's pioneering work of the 1860s was rediscovered. (JA+MR)

**GMOs**: Genetically modified organism - containing foreign genes, Transgenic organisms, currently called Living Modified organisms (LMOs) (JA)

**GENETICALLY MODIFIED ORGANISMS**: See GMOs.

**GENETICALLY MODIFIED VIRUS**: Newly-developed strains of virus created by genetic engineering for specialized purposes such as biological control. For example, Australian research has genetically modified strains of virus to interfere with the ova of introduced mice and rabbits to render them sterile. New Zealand researchers meanwhile have designed a similar virus targeting possums, which are native to Australia. Ethical and ecological concerns include the potential for trans-national spread, potential impacts on related endemic mammals, and the grave avenue of ethno-terrorism and genetically-specific bioweapons. (MP)

**GENETICS** The study of the patterns of inheritance of specific traits. Study of genetic systems, e.g. Gene, chromosomes, nucleus. (DM, JA)

**GENETHICS** a recombinant word that splices genetics and ethics to capture their conceptual inseparability. First used by David Suzuki, a Canadian professor of genetics and public educator. (IP)

**GENEVA CONVENTIONS**: The 1949 Geneva Conventions I-IV provide legal codes on the humane care and treatment of: Convention I - sick and wounded combatants, irrespective of race, religion or politics; Convention II - shipwrecked or wounded at sea; Convention III - prisoners of war, not to be used as hostages, labor, experimental subjects or torture; and Convention IV - protections and rights for civilians during war. The Geneva Conventions were followed up by Geneva Convention Protocols I and II in 1977. These international laws will have their teeth strengthened by international war law institutions such as the International Criminal Court. (See GENEVA PROTOCOLS, HAGUE CONVENTIONS, INTERNATIONAL HUMAN RIGHTS LAW, INTERNATIONAL CRIMINAL COURT) (MP)

**GENEVA PROTOCOLS**: The 1977 Geneva Convention Protocols I and II were an important addition to the Geneva Conventions of 1949. Protocol I refers to limits to the rights of parties to choose the means of warfare, prohibition of weapons causing superfluous suffering, and

prohibition of means of warfare which cause widespread or long-term damage to the natural environment. Protocol II includes humane treatment of victims of non-international armed conflicts. (See GENEVA CONVENTIONS, HAGUE CONVENTIONS) (MP)

**GENITALS:** The reproductive areas and organs of animals. (DM)

**GENITAL MUTILATION:** see FEMALE GENITAL MUTILATION.

**GENOCENTRISM** the belief that the gene is at the center of all things. (IP)

**GENOCIDE :** Genocide is any political or military act committed with the intent of partially or wholly destroying a particular ethnic, cultural, religious or national population. It includes killing members of the group, causing serious mental/bodily harm, inflicting destructive conditions for life, imposing birth-prevention measures or forcibly transferring children on the basis of their race. It was the first of the war crimes to attract international legal condemnation with the 1948 Convention on the Prevention and Punishment of the Crime of Genocide. Conventional warfare and the use of force between nations are not necessarily genocide when directed at a political state rather than a specific racial or cultural group. (See EXTERMINATION, WAR CRIMES, CRIMES AGAINST HUMANITY, ETHNIC CLEANSING, GENEVA CONVENTIONS, INTERNATIONAL CRIMINAL COURT) (MP)

**GENOME:** All the genetic material in the chromosomes of a particular organism; its size is generally given as its total number of base pairs. Weighs about 200th billionth of a gram in humans. (JA)

**GENOME PROJECTS:** Research and technology development efforts aimed at mapping and sequencing some or all of the genome of human beings and other organisms. (DM)

**GENOMIC LIBRARY:** A collection of clones made from a set of overlapping DNA fragments representing the entire genome of an organism. Compare *library* . (DM)

**GENOMICS:** Characterizes the technologies supporting the science of genetics; that is, the DNA informational content of a cell. Since the late 1990s, the field has changed the way we view the biological world since all living organisms, whether bacteria or human, can now have their genomes completely sequenced and archived for ready access. Was a term originally coined to describe the discipline of science concerned with the mapping, sequencing and analysis of genomes - the complete set of genes from an organism and described the "parts manual" for an organism. The commercialization of genome technology, however, is usually focused on the discovery of medically relevant genes as potential therapeutic drug targets or identification of specific gene sequences that are correlated with genetic disorders. Modern advances in genetics have changed the way we view the biological world since all living organisms, ranging from bacteria to humans, can now have their genome sequenced, creating crucial issues of access and ownership of genomes (see BIOINFORMATICS; PROTEOME; PROTEOMICS). (IP)

**GENOTYPE:** The genetic constitution or makeup of an individual. (DM)

**GENUINE PROGRESS INDICATOR:** A monetary measure of national wellbeing and the progress of sustainability. Directly comparable to and based on the Gross Domestic Product (GDP), the Genuine Progress Indicator (GPI) goes further by adjusting for economic estimates of 24 additional factors. Among others, these include income distribution, crime, family breakdown, volunteer work, leisure time, resource depletion, pollution, environmental damage, public infrastructure, defensive expenditures and dependence on foreign assets. The GPI has revealed a gradual decline in national wellbeing since the mid 1970s for countries such as the USA, UK, Germany and the Netherlands. This

indicates that even despite growth in GDP figures, the total environmental and social costs have outweighed the benefits of economic activity. (See **PROGRESS, GROSS DOMESTIC PRODUCT, HUMAN DEVELOPMENT INDEX, INDEX OF SOCIAL HEALTH, SUSTAINABLE DEVELOPMENT**). (MP)

**GENUS:** Level in the classification of organisms above **SPECIES** (q.v.) and below family. For example, the family Delphinidae (the **DOLPHINS** (q.v.)) contains 32 species in 17 genera. However, whereas species can be defined with some degree of objectivity, genera, families and the other levels in the classification of organisms are far more subjective. Their meaning is almost entirely the result of previous historical usage of the terms rather than of any feature of the natural world. (MR)

**GEODESY** : A branch of geophysics, survey methodology involving the mapping of biosphere, map making and correlating with geological, gravitational and magnetic measurements. (JA)

**GEOGRAPHIC INFORMATION SYSTEMS (GIS):** Computer technology for the storage, analysis, manipulation, synthesis and display of spatially referenced information. Overlay mapping allows the integration of multiple geographical or social data sets to find patterns, correlations and new information for strategic management. GIS has applications as a decision support tool for defense, urban planning, hazard management, environmental impact assessment and sustainability monitoring. Privacy concerns have been raised over big corporations using GIS for consumer marketing. (See **REMOTE SENSING**) (MP)

**GEOMETRY** : The study of solid shapes, surfaces, lines, curves and points in space; including the relationship between lines and points on a surface and the calculation of angles between straight lines etc. (IP)

**GEOTHERMAL ENERGY:** Geothermal power uses the heat and pressure generated by the movement of subterranean magma and steam to create a renewable energy supply. (See **RENEWABLE ENERGY**) (MP)

**GERM CELLS (GC)** : Cells connected with reproduction, primordial cells found in testis and ovary. Egg and sperm cells and the cells that give rise to them. (see **GENE THERAPY**). (germ = reproductive) a reproductive cell precursor to the formation of a sperm or ovum (DM, JA)

**GERM-LINE GENE THERAPY** : A gene therapy technology targeting the germ cells that eventually produce gametes; that is, the oogonia in the ovaries and the spermatogonia in the testes. The protocol is of injecting correcting, modifying or additional DNA into the pronucleus of a fertilized egg. The technology requires that fertilization would occur *in vitro* using the usual IVF procedures of super-ovulation and fertilization of a number of egg cells prior to micromanipulation and embryo transfer. Deliberately targeting the human germ-line is problematical from biological and ethical view points, especially in view of unknown consequences passed down generations. To assume the right to manipulate our descendants in this way seems to be an extreme form of arrogance. (See **SOMATIC-CELL GENE THERAPY**; *IN UTERO* GENE THERAPY; **GENE THERAPY**). (IP)

**GERMPLASM:** The total genetic variability, represented by germ cells or seeds, available to a particular population of organisms. (DM)

**GESAMP** : Group of Experts on the Scientific Aspects of Marine Pollution. UN, UNEP, UNESCO. (JA)

**GHOST SPECIES:** Once a population decreases to a certain threshold, the species may be virtually doomed. Lacking sufficient genetic diversity, habitat size or ecological support, the species may live for some time as a non-viable population or require human intervention for the prevention of extinction. Such "ghost species" may lead to an underestimation of biodiversity loss as measured by extinction rate. (See

BIODIVERSITY, ENDANGERED SPECIES, EXTINCTION) (MP)

**GHB** : GHB is short for gamma hydroxybutyrate, a recreational drug also known in the gay and club scenes since the 1990s as Liquid Ecstasy. GHB acts on the dopamine system and has been used medicinally in the past as an anesthetic and antidepressant. When swallowed it has euphoric and aphrodisiac qualities, but taken in excess it may progressively induce drowsiness, nausea, respiratory depression, coma and death. The likelihood of overdose is increased by co-consumption of alcohol and lack of quality control. (See ECSTASY). (IP+MP)

**GIFT**: Gamete intrafallopian transfer.

**GIGA- (G)** : Prefix denoting one billion ( $10^9$ ); for example, 1 gigabyte =  $10^9$  bytes. (IP).

**GINSENG**: (Chinese : *jen-shen* "man image") The man-shaped root from plants of the genus *Panax* (from Greek: *panacea* ). Ginseng grows in China, Japan, Korea and America and is a popular remedy in East Asian and North American traditional medicines. Its tonic, stimulant and aphrodisiac properties are said to be good for digestive, nervous, pulmonary and vitality disorders. Some of the active constituents are steroid compounds, so care should be taken with regular use especially during pregnancy. More modern medical research is required to gauge the safety and efficacy of traditional herbal remedies such as ginseng. (See HERBALISM, BUSH MEDICINE). (MP)

**GIS**: See GEOGRAPHICAL INFORMATION SYSTEMS.

**GLOBAL BRAIN**: See ARTIFICIAL INTELLIGENCE, GAIA, WORLD WIDE WEB.

**GLOBAL COMPACT**: A set of United Nations principles intended to encourage sustainable corporate practices, the Global Compact was released by Kofi Annan at the 2000 World Economic Forum at Davos. The principles cover international human rights (protection from human rights abuses), labor standards (collective bargaining rights, elimination of forced labor, child labor and employer discrimination) and environment (precautionary principle, environmental responsibility and eco-technology). (See SUSTAINABLE CORPORATION) (MP)

**GLOBAL ENERGY BALANCE**: A correspondence between the amount of radiant solar energy absorbed the Earth and the amount radiated back outwards, such that the temperature on Earth remains within a range able to support the presence of life (see GLOBAL WARMING, GREENHOUSE EFFECT). (MP)

**GLOBAL LIBERALISM** - political principles described generally as liberal in the sense of comprehensive ideology or world view, rather than as a partisan political label (see FREE MARKET). (IP)

**GLOBAL PROBLEMS**

**GLOBAL SCALE**

**GLOBAL VILLAGE**: The metaphor of the 'Global Village', popularized by Marshall McLuhan, suggests that the world is becoming a single community through the use of mass media and technology. One of the problems is that people in different parts of the world are often in envy, fear, and often feel manipulated for the economic benefit of the rich. The wealthy few not only protect their neighborhoods with guns – they've exhibited a sense of global village. (See HUMAN FREEDOM INDEX, INDEX OF SOCIAL HEALTH, STATE OF THE ENVIRONMENT REPORT) (MP)

**GLOBAL WARMING**: (See GREENHOUSE EFFECT, CLIMATE)

**GLOBALIZATION** : Globalization commonly refers to a tendency to transcend the boundaries of the nation state. This tendency can be observed in almost every aspect of modern life: ideologies, economics, technical advances, transnational regulations, environmental problems. Whereas in the course of the 20<sup>th</sup> century, nation states have been the main agents in the international community, they are increasingly being replaced by non-governmental and/or transnational actors. Environmentalist movements operate worldwide, international organizations address the problems of global warming or the problem of poverty, and transnational companies are important players on the world market. High technology advances (media, the internet) have enabled individuals to communicate with others in any part of the world, hereby enabled them to participate globalizing their lives.

Nevertheless, globalization cannot only be viewed as a desirable process. Many critics have been addressing the problems that globalization poses: while it broadens the options for westerners and highly educated elites all around the world, it increases discrimination of the poor even further. In this context, globalization can be defined as the spacial and temporal approximation of world regions that have access to high tech means for communication and information. (BP)

**GLUCAGON** : see DIABETES MELLITUS.

**GLUE SNIFFING** : See SOLVENT ABUSE.

**GLUON**: Subatomic particle. (name based on the word "glue" + the suffix "-on" common to particles) Gluons "hold together" groups of quarks. Different types of gluons are distinguished by a quality known as "color". (see QUARK) (AG)

**GLYPHOSPHATE** : See ROUNDUP.

**GMOs** Genetically modified organisms. For example, □c recombinant DNA sequences are used in plants for several purposes: to introduce desirable qualities such as crop yield, disease resistance, herbicide tolerance and insect resistance. See LMOs. Objections to. (FL)

**GNP**: See GROSS NATIONAL PRODUCT.

**GOD**: A being, creator, person, eternal, personal, omnipotent and omnipresent. (JA+FL)

**GODEL, K**: Mathematician who proved that no set of axioms including the laws of arithmetic can ever be complete. There are always true statements that cannot be proven from the axioms. (MV)

**GODS**: Usually "God" refers to the One God, while "gods" refers to deities of polytheistic religions. In polytheistic religions, sometimes statues or other idols are referred to as "gods", but deeper thinkers regard these as material representations of concepts or of spiritual beings. The similarity between the gods of "polytheistic" religions and the angels (q.v.) of "monotheistic" ones may make the distinction between polytheism and monotheism outdated.(FL)

**GOLDEN RULE**: An almost universal principle of ethics, the 'Golden Rule' is summarized by the phrase "*Do unto others as you would have them do unto you*". Variations on this theme recur across most religions and ethical philosophies, including Zoroastrianism, Confucianism, Jainism, Buddhism, Christianity, Islam, in the *Mahabharata*, the *Book of Leviticus*, Kant, Mill's *Utilitarianism*, and Rawls' *Theory of Justice*. Deep Ecology also recognizes the golden rule for the Earth's other species and ecosystems. (See RECIPROCITY) (MP& MV)

**GONDWANA** : about 200 million years ago all major continents were locked together in a supercontinent named Pangea (meaning "all Earth"). Pangea began to break up about 190 million years ago. First, the northern group of continents (Laurasia) split apart from the southern group (Gondwana). Laurasia formed North America and Eurasia while Gondwana broke into three parts; Africa-South America, Australia-Antarctica and India. India drifted northwards and collided with Asia which collision initiated the uplift of the Himalayas. Subsequently, South America and Africa separated and Antarctica separated from Australia. From the outset, continental drift has been closely interwoven with that of evolution. Australia, which has been separated the longest from other continents (about 65 million years) has the most distinct biota, including its indigenous people. Interestingly, the first evidence of life on Earth comes from the north-west of Western Australia, where microbe-size fossils, some of which may have produced oxygen, have been dated at 3.465 billion years before present. South America has the next most distinct biota, having been isolated from other continents for nearly 60 million years. North America and Eurasia, which were joined together for much of Earth's history, have very similar biotas. (IP)

**GOOD SAMARITAN**: The term originates in the New Testament story in the book of Luke (chapter 10). In that story, a Jewish man was attacked by thieves and left for dead. As he lay there by the side of the road hoping for help, two people walked by without extending any assistance. Then a Samaritan (inhabitant of the Samaria region, and traditional enemy of the Jews) took the wounded man to an inn, tended to his wounds, fed him, and paid his expenses. The exemplary behavior of this Samaritan was remembered in the expression "good Samaritan", which was later extended to refer to anyone who saw a person in need and extended assistance. (AG)

**GOSSES**: A Hebrew word referring to a patient who is in the process of dying. There is no clear and universally accepted definition of the word, although some physicians and nurses say that they can recognize someone who is about to die. In Jewish Law, "halacha" (q.v.) a gosses is regarded as totally alive. This means that it is forbidden to disturb a gosses in such a way as to hasten death. It is for this reason that some Rabbis forbid testing for brain death with advanced methods of imaging, because it may disturb a gosses. And killing a gosses is murder. On the other hand, a distinguished Israeli Rabbi, Rabbi Itzhak Silberstein, in "Assia", the Hebrew journal of Halacha and medicine, argued that it is a question which requires further deep study, whether the Law of the Pursuer (Din ha-Rodef, which requires one to take violent action against anyone who is acting so as to threaten the life of an innocent person) applies at all when the threatened person is a gosses. (FL)

**GPS**: Global Positioning System.

**GRADUALISM**: The process and belief in a gradual progression of change, as of erosion in geology. This was the belief underpinning Darwin's concept of evolution until the 'punctuated equilibrium' model of Eldridge andlism than perhaps would the Socialist. (See PUNCTUATED EQUILIBRIUM) (MP)

**GRAPH** : A drawing that illustrates the relationship between numbers, values or quantities and is typically drawn with coordinate axes at right angles. For example, the heights of children of a certain age from differing socioeconomic backgrounds can be shown by making the distance along a horizontal line represent the child's background (converted to an arbitrary number scheme along the affluence-poverty scale) and the distance up the vertical line represent the child's height in meters. (See BAR CHART, HISTOGRAM). (IP)

**GRAY GOO CATASTROPHE**: This term is used in nanotechnology discourse to refer to the possibility of an apocalyptic end to life on Earth as a result of accidental release of the wrong replicating assemblers. Nanotechnology "bacteria" could be designed to utilize elements

such as carbon from their surroundings to replicate more of themselves in an uncontrollable chain reaction. This evolutionarily superior "gray goo" may spread rapidly across the globe to obliterate all species including its creator. (See NANOTECHNOLOGY, NANOTECHNOLOGY WEAPONS) (MP)

**GREAT APE PROJECT** : A book title and organization. The idea is to include the nonhuman great apes (chimpanzees, gorillas and orangutans) within the community of equals by granting them the basic moral and legal protection that only human beings currently enjoy. The book is an edited work from a group of scientists and scholars against the unthinking denial of fundamental rights, or moral protections, to beings who are not members of our own species, but who quite evidently possess many of the characteristics that we consider morally important. The organization is an international group founded to work for the removal of the nonhuman great apes from the category of property, and for their immediate inclusion within the category of *persons* . Their long-term goal is a United Nations Declaration of the Rights of Great Apes. (Web site: <http://www.greatapeproject.org/>) (DM)

**GREAT BARRIER REEF MARINE PARK**: Australia is home to the largest coral reef in the world, the Great Barrier Reef extending from tropical latitudes to temperate ones, a super-organism visible from space. It is managed as a multiple-use zoned Marine Park. Forty different bioregions are recognized; within these Green Zones are protected, Yellow is for recreational fishing and Blue for commercial fishing excluding trawling. Many of the world's coral reef Marine Science and Great Barrier Reef Marine Park Authority. (See CORAL REEF, MARINE PARK) (MP)

**GREED**: (Old English *graedig* "covetous"). Excessive desire to acquire or consume more than is reasonable or fair, for example in relation to wealth, power or resource consumption. (see SUFFICIENCY). (MP)

**GREEN**: (German: *grün* 'grow') The adjective green implies association with ecology, conservation of nature and relevance to environmental issues; for example the 'green revolution' involved new high-yield agricultural techniques, a 'green belt' is uncultivated nature or parks surrounding a community, 'greenery' is growing plant foliage, 'greens' are leafy vegetables, and a 'green thumb' implies gardening ability. The green activist movement has been building since the early 70s along with green politics and organizations such as Greenpeace. Conservationists have become 'greenies' with 'shallow/light green' or 'deep/dark green' ideologies. Green is also increasingly used as an adjective - 'green products', and as a verb - 'greening' a corporate image. (See GREEN MOVEMENT, GREENIES, DEEP ECOLOGY, ECOLOGISM, ENVIRONMENTALISM) (MP)

**GREEN BAN**: 'Green Bans' are strikes or union bans imposed in recognition of particular ethical or environmental concerns identified by the workers or community. (See GREEN MOVEMENT, INDUSTRIAL ACTION) (MP)

**GREEN CONSUMERISM**: Concern for the environmental and human health has created economic demand for green products, green labeling, recyclable materials, organic foods, soft energy/technology, green standards of practice, corporate responsibility/liability, ethical investments, etc. Multinational corporations have responded, not only in forms like the Body Shop and health-food stores, but more broadly across the spectrum - corporate and executive images are being cleaned and greened ranging from Microsoft to British Petroleum. The power



of consumer demand is one of the motivating factors towards a green economy; others include green politics, green taxes etc. (See GREEN, ENVIRONMENTAL ECONOMICS, ECOLOGICAL ECONOMICS) (MP)

**GREEN FLASH** is an intense, brief flash visible under certain conditions following the moment the sun goes beyond the horizon. The phenomenon is due to refraction of light rays from the setting sun as they pass through the lower layers of the atmosphere (see CORONAS, RAINBOWS, MIRAGES & HALOES). (IP)

**GREEN MOVEMENT:** A strong international activist movement and political viewpoint which has the following central assumptions: intrinsic value and preservation of nature, eco-centrism, ethical value systems, sustainable development, grassroots democracy, social and economic justice, disarmament and non-violence. It involves movement towards the alternative environmental paradigm of a decentralized, non-consumeristic, non-nuclear, participatory, harmonious society. The green movement shares the aims of the peace movement and some of those of the anti-globalization movement, recognizing that ecological values require factoring in to human activities, and that poverty itself comprises a threat to environmental protection. Some of the earliest environmental political groups were formed in West Germany by people such as Petra Kelly, the German Greens, '*Grüne Aktion Zukunft*' and electoral candidate 'green lists'. Politically, for example, the 'Green Bans' from 1971, partly inspired by the women's group 'Battlers for Kelly's Bush', were meant to bring about salinization), despite efforts such as the '*National Strategy for the Implementation of Sustainable Development*' in combination with the National Parks and Wildlife Service and organizations such as Australian Conservation Foundation and the Wilderness Society. Globally the movement includes United Nations Environment Programme (UNEP), International Union for the Conservation of Nature and Natural Resources (IUCN), environmental watchdogs like WorldWatch Institute, green charities like World Wildlife Fund, and activist networks like Friends of the Earth and Greenpeace. Prominent international contributors to the green movement have included in no particular order Rachel Carson, David Suzuki, Gro Harlem Brundtland, David Attenborough, Chico Mendes, Jane Goodall, Dian Fossey, Wangari Maathai, Jacques Cousteau, Paul Ehrlich, Theodore Roszak, Richard Leakey, Edward Goldsmith, Lester Brown, Norman Myers, Howard Rheingold, James Lovelock, Amory and Hunter Lovins and E.O. Wilson. (See GREEN, GREENIES, GREEN CONSUMERISM, ENVIRONMENTALISM, ACTIVISM, PEACE MOVEMENT, ANTI-GLOBALIZATION MOVEMENT, SUSTAINABLE DEVELOPMENT) (MP)

**GREEN REVOLUTION :** The very large increase in agricultural productivity in the late 20<sup>th</sup> Century facilitated by the introduction of high-yielding crop varieties, increased use of pesticides and fertilizers, and improved management techniques. The Consultative Group for International Agricultural Research (CGIAR; <http://www.cgiar.org/>) coordinates a network of international agricultural research institutes focused especially on the needs of developing countries; CGIAR has been involved in many of the innovations that made the green revolution possible. (RW)

**GREENHOUSE EFFECT:** Trapping of heat within the Earth's atmosphere. If the Earth had no atmosphere, its average surface temperature would be about -18 oC but the various GREENHOUSE GASES (q.v.) prevent much of the incoming radiation from the Sun from being re-radiated out into space. Some of these gases, particularly carbon dioxide, are increasing in concentration as a result of human activity - particularly the burning of fossil fuels. (See GLOBAL WARMING) (MR)

**GREENHOUSE GASES:** Carbon dioxide, water vapour, methane, nitrous oxides, chlorofluorocarbons (CFCs), nitrous oxides and the other gases that trap heat within the Earth's atmosphere. (See GREENHOUSE EFFECT) (MR)

**GREENIES:** Colloquial term for people active in or concerned with conservation, environmental issues or green politics. People with a green outlook range from everyday citizens through to deep ecologists and radical activists, and usage of the term 'greenie' ranges from friendly to derogatory depending on perspective. Greenies may have much in common with related groups, especially with the peace movement ('peaceniks'), small-scale sufficiency lifestyles ('hippies'), and to a lesser degree with socialist ideology ('reds'). Greenies should try not to be inexperienced or gullible ('greenhorns'), avoid over-consumption (unlike the 'yuppie'), and stand opposed to those who fight, hunt or discriminate ('rednecks'). (See HIPPIES, YUPPIES) (MP)

**GREER, GERMAINE :** (1939- ). Australian writer and feminist whose influential best seller *'The Female Eunuch'* (1970) became in the 1970s the public face of feminism. Greer rejects the stereotype of femininity that 'castrates' women by conditioning them to believe that passivity and dependence is the natural female state. Throughout her career she has urged women to fight against this artificial attitude and, if they are to fully express their genetic creativity, encouraged them to explore their sexuality. In her later works Greer investigated the importance of motherhood to women in *'Sex and Destiny: The Politics of Human Fertility'* and whether aging post the menopause is a special kind of female liberation in *'The Change: Women, Ageing, and the Menopause'* 1991. (See BEAUVOIR, SIMONE DE, DWORKIN, ANDREA). (IP)

**GROSS DOMESTIC PRODUCT (GDP):** GDP is an aggregated annual measure of the total market value of goods and services produced within a nation. "Gross" implies that expenditures on replacement of capital goods are not deducted, and "domestic" implies that incomes from foreign investments are not included. The problem with GDP lies in how the statistic is used and interpreted. GDP is an index of economic turnover rather than national wealth, as it fails to measure the value of unpaid and voluntary work, or the economic potential of existing infrastructure and unexploited natural resources. Importantly, it does not differentiate between detrimental and sustainable generation of income, masking the impacts of some economic activities on social and natural systems. For example, GDP registers economic gain from such things as accidents requiring medical treatment, inbuilt obsolescence of goods, and environmentally destructive developments. The common use of GDP per capita as a measure of quality of life or human wellbeing is therefore flawed by its inability to pick up such social and environmental consequences. A nation's GDP must be compared with other broader indicators such as the Human Development Index or Genuine the people. (See GROSS NATIONAL PRODUCT, GENUINE PROGRESS INDICATORS, HUMAN DEVELOPMENT INDEX) (MP)

**GROSS NATIONAL PRODUCT (GNP):** GNP is an aggregated annual measure of the total market value of goods and services produced by a nation, including income from overseas investments but excluding income to overseas investors. GNP influences the distribution of power and policy in the international economic system, for example voting power in the International Monetary Fund. Although GNP is a useful economic statistic, it is not necessarily an accurate measure of sustainable progress or human well being. (See GROSS DOMESTIC PRODUCT, GENUINE PROGRESS INDICATORS) (MP)

**GROUNDWATER:** Sub-surface fresh water infiltrating the spaces between soil particles, contained in permeable rock or in voids between

rock layers. Sustainable management of the saturated "water table" is required to prevent soil and groundwater salinity. In the upper "vadose" zone, some water is bonded to soils, whereas the "phreatic" zone is beneath the saturated level of the water table. Underground reservoirs and aquifers such as Australia's Great Artesian Basin are not necessarily renewable and require protection from pollution and overuse. (See WATER CYCLE) (MP)

**GROUP DECISION SUPPORT:** See DELPHI METHOD, DECISION SUPPORT SYSTEMS.

**GROUP SELECTION:** See INDIVIDUAL SELECTION.

**GROWTH:** Enlargement (increase in size, development, knowledge, wealth). Growth is an existing characteristic of many global phenomena, such as human physiology, human populations, size of corporations, successful industries and certain value systems. With growth can come inequality and decreased wellbeing, for example profits to rich international food chains instead of local food merchants. In a world of limits, growth often comes at the expense of others or the environment. Such negatives are measured as growth in indicators such as Gross Domestic Product (GDP), but should not be considered progress or sustainable development. Growth implies a transition to maturity - the application of mature ethical principles to wisdom. Hopefully growth to collective maturity is the next stage of progress. Ironically perhaps, those attempting to spread free the ideas and applications of sustainability and bioethics can learn from growth practices such as efficiency and marketing. (See ADOLESCENCE, DEVELOPMENT, PROGRESS, GROSS DOMESTIC PRODUCT, EXTERNALITIES, OLD AGE) (MP)

**GROWTH HORMONE (GH):** A hormone which contributes to the growth of a child. Its availability may also be related to the aging process. GH from cadavers was once used to replace GH deficiency in short-stature children. But a suspected link between cadaver-derived GH and Creutzfeld-Jacob disease encouraged the development of genetically engineered GH derived from genetically modified E-Coli. The use of GH for healthy, non-GM deficient, but short stature children raises bioethical questions of pediatric informed consent, of whether "short-stature" is a medical or a culture-relative term, and of whether medical solutions ought to be applied to problems for which alternative solutions, such as sport, martial arts, change of attitude and lifestyle, might be tried. These questions are all the more salient since there is no conclusive evidence that GM treatment for healthy, short-stature children affects final height rather than just growth rate. (FL)

**GUERRILLA WARFARE:** See INSTITUTION OF WAR, CHE GUEVARA.

**GUESSWORK:** See CONJECTURE.

**GUIDELINES :** Directions or principles set forth by groups such as government agencies, institutions, professional organizations, or expert panels to establish current or future rules of policy. (See STANDARDS, CODES OF ETHICS). (DM)

**GUILT:** (Old English: *gylt* derived from *gield* 'payment') Being responsible for having committed a specified or implied offense; that is, transgressed beyond the fundamental way we, as social creatures possessing an ethical consciousness, should conduct ourselves (Old English *gylt* derived from *gield* payment. (IP)

**GURU GRANTH SAHIB :** The most sacred book of the Sikhs, compiled by Guru Arjan (1563-1606) (see Sikh). This book is so revered by the Sikhs it is given the honorary title of "Guru" (teacher). This title is usually only applied to human beings, and so, when used in connection

with this text, it conveys the idea that one is standing in the presence of a teacher when standing before this book. A central theme of the Granth is the unity of God and God's transcendence. The book contains many hymns praising the greatness of God. (AG)

**GUT:** See GRAND UNIFYING THEORY OF NATURE. Also a term for the intestinal tract.

**GYMNOSOPHY:** "Gymnos" means nudity in Greek, and "Sophia" means wisdom. Gymnosophy is an ethic encouraging nudism (q.v.) as a way of divesting oneself of attachment to material possessions or to anything which covers what one really is or makes one appear other than what one really is, in order to achieve a more spiritual state, a greater closeness to nature, or more authentic relations with other people. There have been gymnosophical sects since ancient times, and there is a gymnosophical branch of Jainism in India today. In the 1960's and 1970's in the West, public nudity was a form of protest against war, capitalism and authoritarianism. This was a neo-gymnosophy, although the word was not used. (FL)

**GYMNOSPERM:** The cone-bearing trees, evolutionarily older than the angiosperms, for example conifers and boreal forest such as pine, spruce and fir trees. (See CONIFEROUS FOREST, SOFTWOODS, ANGIOSPERM) (MP)

**GYNECOLOGY:** Branch of medicine dealing with diseases of the female reproductive tract.(see obstetrics). A branch of medical science that deals with the physiological condition and function of the reproductive system of women. *It has been confused for not dealing with broader aspects of women's health.* <DM+JA)

**GYPSY :** See ROMA.

## H

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<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**HABITAT:** The environment or ecological space in which a plant or animal naturally lives and grows, for example the tropical rainforest, beach-front or coral reef habitats. May be described as the organic and inorganic sum total of the environment which can have an influence on, or be experienced by a species. Although often described as discrete ecological groups or geographical distributions, habitat boundaries typically merge and overlap. It is increasingly realized that good environmental and economic management must primarily focus on the habitat

level in order to successfully manage the sustainability of smaller units such as biodiversity. (See BIODIVERSITY, ECOLOGY, ECOSYSTEM, HABITAT DEGRADATION, HABITAT DESTRUCTION) (MP)

**HABITAT BUFFERS:** See BUFFER ZONES.

**HABITAT CONSERVATION:** Habitat-level is an appropriate system level for environmental scientists and policy-makers to work at, because ecological systems and endangered species are subsystems also preserved by habitat conservation. Habitat conservation should place high priority on the habitats most vulnerable to extinction (e.g. the 'ecological hotspots'), the few remaining habitat specimens should be protected, and habitat corridors, culture, biological HABITAT TYPES, HAB (MP)

**HABITAT CORRIDORS:** The impacts of habitat fragmentation can be somewhat alleviated by the provision of habitat corridors: wide connecting areas of appropriate habitat to link existing ecosystems and allow connectivity, biophysical regeneration, migration, genetic exchange, foraging routes, ecosystem services and biodiversity conservation. A corridor implies free movement, ranging from wildlife tunnels under large roads to large-scale links between National Parks. Habitat corridors also provide aesthetic values and hazard protection to intervening suburban landscapes. (See WILDLIFE CORRIDORS, HABITAT FRAGMENTATION, RESTORATION ECOLOGY) (MP)

**HABITAT DEGRADATION:** Habitat degradation is the gradual erosion of environmental integrity, quality, biodiversity and aesthetics, leading ecosystems into a state of fragmentation and several steps closer to destruction. Usually a result of human activity, habitat degradation includes industrial pollution, climate change, forestry and mining operations, dams, desertification, salinization, loss of land fertility, erosion, edge effects, ecological effects of pesticides, water diversion, river turbidity, eutrophication, trawling, coral bleaching, introduction of diseases, exotic predators, invasive weeds or vulnerable genetic stock etc. New generations may not bear witness to the true beauty and bounty of surroundings they inherit, and adjust to a lower standard of environmental quality and diversity. (See HABITAT DESTRUCTION, HABITAT FRAGMENTATION, ENVIRONMENTAL INTEGRITY) (MP)

**HABITAT DESTRUCTION:** Widespread forms of habitat destruction, which lead to fragmentation of what remains, include deforestation, land clearing, slash and burn cultivation, cattle ranching, large-scale agriculture, large-scale mining, the effects of large dams, industrial warfare, industrial and suburban encroachment, urban sprawl and the ecological footprint of cities etc. Of human activities, agriculture and grazing occupy the most land-surface area, with corresponding opportunity cost for natural ecosystems. Habitat destruction is obviously one of the priority issues in environmental ethics, requiring political and community activism and economic restructuring. (See HABITAT DEGRADATION, GREEN POLITICS) (MP)

**HABITAT FRAGMENTATION:** The creation of unconnected biogeographic 'islands' of habitat subdirectly hampers sustainable policy. (See ECOSYSTEM FRAGMENTATION, HABITAT CORRIDORS, EDGE EFFECTS, BUFFER ZONES) (MP)

**HABITAT ISLAND:** A section of habitat isolated from other areas of the same habitat by the surrounding environment - for example a forest glade or a habitat fragment within an agricultural or suburban landscape. (See HABITAT FRAGMENTATION) (MP)

**HABITAT PARTITIONING:** The differentiation of microhabitats and ecological niches between closely related organisms. (See NICHE DIFFERENTIATION) (MP)

**HABITAT RESTORATION:** See RESTORATION ECOLOGY.

**HABITAT TYPES:** Major terrestrial global habitats include polar, arctic tundra, boreal/coniferous forest, deciduous forest, sclerophyll forest, temperate rainforest, tropical rainforest, mangrove, montane, island, savannah and desert. Marine habitats include the deep ocean, 'blue-water', coral reagricultur are also habitats), by space (e.g. continuous, patchy or isolated habitats), by demographic effect (e.g. size-beneficial habitats), by R.H. MacArthur and E.O. Wilson's classic r/K concept (r = selection for rapid reproduction; K = delayed reproduction), by J.P. Grime's classification (according to disturbance strategy), by ecological succession (e.g. seres, climax co are the appropriate scaled units of study for effective ecology, environmental science and managemenECIDUOUS FOREST, CONIFEROUS FOREST, MANGROVE FOREST, MONTANE, TAIGA, TUNDRA, SAVANNAH, LITTORAL, CORAL REEF) (MP)

**HACKER:** A hacker uses extraordinary knowledge of the internet to break security limitations and explore, sometimes even change, the information stored on computer systems. A 'cracker' is a criminal hacker, who may commit credit fraud, steal identities and release viruses or worms. To 'phreak' is to illegally access telephone systems and other lines of communication. To 'crack' software is to bypass security codes which prevent piracy by non-paying users. The 'hacktivist' works for a social or ideological cause. (See HACKTIVIST, CYBER CRIME, COMPUTER VIRUS, WORM) (MP)

**HACKTIVISM:** Hacking for a social or ideological cause, hacktivism utilizes the power of the internet to uncover dirty information about corporations, 'enhance' their MPUTER VIRUS, ECO-TERRORISM) (MP)

**HADITH:** (from the Arabic root H.d.th., meaning "to report, to relate") Collections of traditions relating to Muhammad and his companions. These traditions carry considerable weight in terms of Islamic customs. Various Hadith collections exist, and each is listed according to the name of its compiler. The chain of transmission of traditions carries great weight in Hadith collections, and each Hadith tradition is quoted preceded by the chain of narrators who transmitted it from teacher to student. As a result, the most important Hadith collections are the ones with the clearest and most reliable chain of transmission. The most authoritative collection of Hadith is that of al-Bukhari. (AG)

**HAGUE CONVENTIONS :** The first (1899) and second (1907) Hague Peace Conferences were early conventions to limit the conduct of warfare and development of inhumane and expensive armaments. The Hague Conventions are legal codes for the conduct of war, including prohibitions on the use of poison gas, attacks upon surrendered soldiers, attacks upon undefended civilian targets, or weapons calculated to cause unnecessary suffering. The Hague continues its involvement in international human rights law, for example the 1923 agreement to restrict aerial bombing to military not civilian targets, and since 1993 the Hague War Crimes Tribunal. (See HAGUE TRIBUNAL, GENEVA CONVENTIONS, LIEBER CODE, INTERNATIONAL HUMAN RIGHTS LAW) (MP)

**HAGUE TRIBUNAL:** The Hague Tribunal for War Crimes in the Former Yugoslavia was established for the UN Security Council in 1993 to uphold international humanitarian law over alleged crimes against humanity perpetrated during the Balkan Wars, by defendants including Dusko Tadic, Radovan Karadzic, General Ratko Mladic and President Slobodan Milosevic. (See HAGUE CONVENTIONS, INTERNATIONAL HUMAN RIGHTS LAW, INTERNATIONAL CRIMINAL COURT, CRIMES AGAINST HUMANITY) (MP)

**HALACHA:** A Hebrew word literally meaning "walking", and referring to the path which a religious Jew is expected to follow in life. Etymologically and semantically, the word is therefore similar to "DO" in Japanese and "TAO" in Chinese. Its basis is the Bible, especially the first five books, which are called the Tora. According to tradition, the Tora was given to Moshe at Mount Sinai in a written form, together with an oral interpretation, which was passed on by word of mouth, from generation to generation, until much of it was finally written down, in the

"Mishna", during the time of Roman rule in the Land of Israel. But writing it down did not mean that there would not be further need for interpretation, and further discussions, commentaries and legends were written in the first centuries A.D. in the Talmud. This process of continuous discussion and interpretation has continued to this day. The entire corpus, includes thousands of books. Those opinions upon which there is wide consensus are collectively called the Halacha.

Halacha includes religious guidelines having to do with prayer, Sabbath observance, Jewish dietary laws, etc, as well as the future bringing of sacrifices to God-about which there is a debate whether they will include animals or be vegetarian. It also includes laws of ethical behavior between friends, neighbors and business associates. Halachic authorities, moreover, have always dealt with great bioethical questions arising in the social and scientific contexts of their times. Today there is a growing body of Halacha dealing with biomedical ethics, environmental ethics, animal rights, etc. A general introduction is in Rabbi Immanuel Jakobovits' book: Jewish Medical Ethics. There is also a journal of halacha and medicine, *Assia* (meaning "physician" in Aramaic) which appears in Hebrew and English. (FL)

**HALAL:** Arabic word meaning "permissible". In the context of diet, this term refers to foods which are permissible to observant Muslims. Some of the key factors involved in Halal foods include: Avoidance of the pig and its products, avoidance of meat from an animal which was not slaughtered at the neck with a pronouncement of the name of God over it, and avoidance of alcohol. The status of certain sea creatures is debated, and is considered Halal by some Muslims, but not by others. Most food products which are kosher (see KASHRUT) are considered Halal as well. (AG)

**HALF-LIFE:** See METABOLISM, RADIOACTIVITY.

**HALLUCINATION** a sensory perception occurring in the wakeful state which is not the result from external stimuli and may be auditory, gustatory, olfactory, tactile or visual. Hallucinations may be induced by drugs or may be a symptom of mental or physical disorders; such as noted in schizophrenia (Latin *alucinari* to wander in mind). (See HALLUCINOGENS) (IP)

**HALLUCINOGENS** : one way to classify drugs is by their major effect(s) but, typically, there are numerous areas of overlap. The drugs which cause hallucinations (a marked change in the user's sense of the world) are classified as hallucinogens. These include drugs of potential abuse such as mescaline, LSD, magic mushrooms and similar substances. The most well known hazard is the so-called 'bad trip', manifested by uncontrollable fear, panic and a feeling of impending insanity. (See HALLUCINATION, PSILOCYBIN, RECREATIONAL DRUGS). (IP).

**HALOES** are a colored or whitish ring or arc of light around and extending outwards from the sun or moon when seen through an ice crystal cloud or a sky filled with falling ice crystals. In general the processes of reflection, refraction, scattering and diffraction, individually or in combination, produce a wide variety of beautiful optical phenomena in the atmosphere (See AURA, CORONAS, RAINBOWS, MIRAGES, HALOES & GREEN FLASH). (IP)

**HANDICAP** a social disadvantage resulting from an impairment or disability which limits or prevents the fulfillment of a "normal" role in life. In the bioethical sense, handicaps, are imposed by society as an additional limitation and could be significantly reduced by a change in social attitude. (DM)

**HAPLOID:** A single set of chromosomes (half the full set of genetic material), present in the egg and sperm cells of animals and in the pollen cells of plants. Human beings have 23 chromosomes in their reproductive cells. Compare *diploid* . Haploid indicates half of total chromosome (n) of diploid number (2n) in gametes due to reduction division (meiosis). (DM, JA)

**HAPPINESS** : A state of mind typically described as akin to pleasure, joy or enjoyment; however, in the language of natural science joy/pleasure are rendered transient emotional states while happiness is a continuum of pleasure or desired mood tempered by personalized values, history and a unique view of life. Thus, happiness, from the biological point of view, demands both the mind's powers of reasoning and emotional intelligence – the understanding and use of emotional informatitate of consciousness) can be spontaneous or artificially induced. The constitutional right of men and women to pursue their 'happiness' means the them the highest enjoyment. (See JOY; PLEASURE; EMOTIONAL INTELLIGENCE; WELLBEING; DOPAMINE). (IP)

**HAPPY-GO-LUCKY**: The condition of a person who trusts happily and haphazardly to luck in their passage through life. (See HAPPINESS) (MP)

**HAPPY LIFE EXPECTANCY**: A comparative measure multiplying average life expectancy (in years) with average life satisfaction (on a 0-1 scale) in different countries. 'Happy life expectancy' is strongly correlatelated with murder rate, corruption, military dominance and gender inequality. (See HAPPINESS, WELLBEING, QUALITY OF LIFE, LIVING STANDARD, LIFE SATISFACTION) (MP)

**HARAKIRI**: (Japanese: *hara* "belly" + *kiri* "cut") Japanese ritual suicide by self-disembowelment with a sword. Also known as harikari or seppuku, in former times this was considered a suicide of honour when disgraced or sentenced to death. (See KAROSHI) (MP)

**HARD ENERGY**: Non-renewable fossil fuel energies like coal and oil, typical of current majority consumption, which produce air pollution, greenhouse gases and are ultimately non-sustainable. *Soft Energy Paths* by Amory Lovins also includes nuclear power as 'hard energy' because of its inherent danger and waste problems. (See HARD TECHNOLOGY, SOFT ENERGY) (MP)

**HARD POWER**: Traditional 'hard' powive over the long term than the use of 'soft' power options. (See HAWK, SOFT POWER) (MP)

**HARD TECHNOLOGY**: Technology which is typically high in resource and energy consumption and pollution emissions, often involved in the production and manufacture of unnecessary consumer goods and dangerous applications of science. Such industries produce waste and are wasteful of resources, have unsatisfying labor-intensive working conditions, and may be dogged by ethical controversy. Hard technology is usually associated with the 'hard power' and 'hard energy' industries. There are opportunities forthcoming from across the board of technologies, and socially responsible corporate codes of conduct would shift heavy industry towards the sphere of 'soft' or sustainable technologies. (See SOFT TECHNOLOGY, HARD POWER, HARD ENERGY) (MP)

**HARDWARE**: Mechanical and electronic equipment such as work tools, gear, gadgets and machines. Also the material (non-software) elements of computers such as keyboard, monitor, motherboard, central processing unit, discs, drives, cards and chips. (See SOFTWARE, COMPUTER) (MP)

**HARDWOODS**: Durable, firm, compact timbers, or the angiosperm trees yielding such wood. Examples include eucalyptus, oak, maple and mahogany. (See SOFTWOODS) (MP)

**HARM MINIMIZATION** : Harm minimization is a management strategy which attempts to protect individuals or the environment from



harm as the main priority ahead of political or commercial considerations. The term is most commonly used with reference to the war on drugs and the consequences of drug addiction - it implies a pragmatic acknowledgment that addicts will continue to use, and treats addiction as a medical rather than a criminal problem. Harm minimization for addicts/victims is not necessarily incompatible with zero tolerance for drug traffickers/dealers. Common harm minimization strategies include needle exchange programs, heroin trials, medically-supervised injecting rooms, methadone programs, access to counseling and medical supervision, pharmacotherapy, ecstasy testers in clubs, drug education in schools, tolerance of possession for personal use, discrimination between 'hard' and 'soft' drug categories, imprisonment only as a last resort, and drug decriminalization. (See DECRIMINALIZATION, HEROIN TRIALS, ZERO TOLERANCE). (IP+MP)

**HASHISH** : (Arabic: "hemp" or "dried grass") The purified exudation of resin and pollen from plants of the genus *Cannabis* , which forms a sticky brown substance which is smoked for its euphoric effects. Its active constituent (THC) is the same as for marijuana, and despite its illegality, hashish is very popular among young people especially in Europe. Hash or hash oil are usually smoked with tobacco to enable burning, however this habit risks nicotine addiction. (See MARIJUANA, THC). (IP+MP)

**HAWK**: A colloquial term for a hard-line politician or international strategist who considers that power and strength are fundamental to success in foreign relations. Hawks are characterised by a mistrustful and adversarial nature, believe in deterrence and coercion, and have a willingness to use aggressive armed conflict. The outcome of hawkish behaviour from both sides can be the self-fulfilling prophecy of war. The hawk mentality is named after predatory diurnal birds of the family Falconidae such as falcons, goshawks, kites and buzzards. Other related meanings include to hunt on the wing, a person who preys upon others, or an aggressive salesperson. (See DOVE) (MP)

**HAZARD** : " a biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect. (JA)

**HAZARDOUS CHEMICAL** : See HAZARDOUS SUBSTANCE.

**HAZARDOUS MICROORGANISMS** : Any microscopic organism, bacteria/virus/fungi/mycoplasma, cell lines/stem cells/algae/protozoans that may be used in biological warfare including genetically modified microorganism. (JA)

**HAZARDOUS SUBSTANCE** : Any chemical substance/chemical preparation or chemical substances by reason of their chemical properties/physico-chemical nature are liable to cause harm to all living organism/environment, including human beings. Usually categorized by a competent authority (specified by a given country's federal government under the Environment (Protection) Act or similar government notification) and listed for public knowledge and for legal purposed. (JA)

**HAZARDOUS SUBSTANCE-AUTHORIZATION** : Authorization given to a person /organization by a national competent authority to visit a Hazardous substance waste-dump-site to collect/treat/transport /store or dispose such waste. (JA)

**HAZARDOUS WASTE-DUMP-SITE** : A disposal site for hazardous waste material which has been duly approved by the competent authority; a place for final storage for disposal/treatment. Eg. Nuclear waste. (JA)

**HAZARDOUS WASTE TREATMENT FACILITY** : A facility wherein treatment of disposal of hazardous waste or processes incidental to such treatment/disposal is carried out. (JA)

**HEALTH**: A condition of complete physical, mental, social and spiritual well-being - not just the absence of disease. The maintenance of health is not a static condition, rather a well-directed homeostatic response to continually changing environmental conditions and the need to adapt to them (see HOMEOSTASIS and WELLBEING). (IP)

**HEALTH CARE DELIVERY** : The provision and distribution of health services to a population . (DM)

**HEALTH EDUCATION** : Health-related education geared to the consumer or patient or society. (DM)

**HEALTH FACILITIES** : Institutions including clinics, hospitals, tissue banks, and other physical structures linked to the provision of health care or diagnostics. (DM)

**HEALTH HAZARDS** : See BIOHAZARDS, ENVIRONMENTAL HAZARDS, OCCUPATIONAL EXPOSURE, RADIATION, TOXICITY.

**HEALTH INFORMATION** : See MEDICAL INFORMATION DIRECTORIES.

**HEALTH INSURANCE** : A system of financing to insure persons against health-related risks. Both private and public sector health insurance schemes exist. (DM)

**HEALTH MAINTENANCE ORGANIZATIONS (HMOs)**: Organizations providing health services to enrolled members for a fixed fee, commonly used term in USA. (See MANAGED CARE PROGRAMS). (DM)

**HEALTH PERSONNEL** : Term used to include all persons related to delivery of health care, including Administrators, Dentists, Doctors, Nurses, Patient care team, Pharmacists, Physicians, Social workers. (DM)

**HEALTH SERVICES RESEARCH** : Research concerned with the organization, administration, needs, and functioning of health services. (DM)

**HEALTH SYSTEMS**: Includes hospital services and their satellite paramedical systems, community care and health promotion, holistic view is that it enables people to live healthy lives. (JA)

**HEARING** : the sense that enables sound to be perceived. The ear is the organ of hearing - it is supplied by the 8th cranial nerve which is stimulated by the vibrations caused by sound waves. Every sound produces sound waves or disturbances in the air, which travel at about 340 meters per second. Because of its shape, the outer external ear concentrates the waves and directs them along the auditory meatus causing the ear drum (tympanic membrane) to vibrate. These vibrations are transmitted through the air-filled middle ear by movements of the auditory ossicles - three very small bones called the malleus, incus and stapes. The ossicles extend across the middle ear and function like a series of movable joints with each other and with the medial wall separating the middle and inner ear cavities called the oval window. It is the stapes that rocks to and fro in the oval window setting up fluid pressure waves in the internal ear which stimulate the neuroepithelial cells of the organ of hearing the cocklea from which nerve impulses pass to the hearing areas in the mid brain and cerebral cortex. It is in the brain where sound is perceived. Also situated in the internal ear are the semicircular canals - three tubes arranged so that one is stimulated in each of the three planes of space. The semicircular canals have no auditory function although they are closely associated with the cocklea - they provide information about the position of the head in space, contributing to the maintenance of equilibrium and balance. There are many diseases of the ear - prominently infections which may permanently affect hearing due to destruction of, for example, the ossicles causing conduction hearing loss or deafness, or damage to the cocklea or auditory nerve causing sensorineural hearing loss or deafness. Deafness in the young is usually caused by faulty nerve perception and may be due to genetic abnormality, rubella infection in the mother in the first 3 months of pregnancy or acute hypoxia (asphyxiation) at birth or soon after. (See HYPOXIA, SENSES, SOUND). (IP)

**HEARING LOSS** : See HEARING.

**HEATING**: Heat is a form of energy transfer. Specific heat capacity is the energy required to raise one kilogram of a substance by one Kelvin. Heat always travels from matter at a higher temperature to matter at a lower temperature. This is the basis of the solar hot water system and the heat pump. Some animals have a heat exchange system to maintain the body temperature of organs such as the brain. Heating and cooling of

home and work spaces requires significant global energy resources, so building materials should be selected which are slow to transfer heat. (See TEMPERATURE) (MP)

**HEAVEN:** Place reserved for the righteous after death. Many religious traditions include a belief in some form of heaven, which reflects the reward in the next world that doers of good deeds will receive after death. This place is referred to in opposition to a place known as hell, which is reserved for evildoers. (see Hell). Some religious systems however, hold an alternate view, that the souls or spirits of those who have died go to a place known as "netherworld", regardless of their moral standing. (see Netherworld) Many different descriptions exist of heaven in different religious traditions, some more elaborate than others. However, these various traditions do seem to be in agreement about general ideas of heaven. For example: that heaven is a place where there is no pain or suffering, and that it is a pleasurable place, whether in spiritual or physical terms. (AG)

**HEDONISM :** What serves a person's interest is that which makes that individual's life happiest (Gk *hedone* meaning pleasure). (IP)

**HEGEL, GWF:** (1770-1831) German philosopher of metaphysics and history. He believed that history is a process in which Spirit reveals itself and achieves freedom through a "dialectical" process involving "thesis", "antithesis" and "synthesis". In his essay "Philosophical History" he argued that this process has undergone stages in which the Orientals only knew that one is free, the Greeks knew that some are free, and finally the Germans achieved the realization that man, as such, is free. His spiritual dialectic was adopted by Marx (q.v.) and converted to a material dialectic. The idea of a three-stage dialectic obviously has some truth, even in bioethics. For example the radical disregard for kindness to animals (thesis), engendered a radical animal- rights movement (antithesis), which may be resulting in a compromise (synthesis) in which experimentation is continuing but with much greater efforts to reduce the suffering to animals. (FL)

**HEISENBERG's UNCERTAINTY PRINCIPLE:** Werner Karl Heisenberg's theory central to measurement of a system in quantum mechanics have provided fuel for the philosophical concept of free will. (See QUANTUM THEORY) (MP)

**HELL:** Place reserved for the wicked after death. This place is mentioned in opposition to heaven, which is the place of the good and righteous. (see heaven) Hell is described in many traditions as a place of suffering and torment, and most descriptions also refer to hell as a place of great heat, in which the high temperatures contribute to the suffering of those within. The concepts of hell and heaven are strong in Zoroastrian belief, due to this system's strong dualism. This Zoroastrianism view of the afterlife had major influence on Judaism, Christianity and Islam. In Catholic teaching, a third category in addition to heaven and hell is taught, due to various theological considerations (see Limbo). For an alternate approach to the afterlife, see the entry Netherworld. (AG)

**HELSINKI DECLARATION:** A Declaration of the World Medical Association (WMA) adopted by the 18th WMA General Assembly in Helsinki, Finland in June 1964 on Ethical Principles for Medical Research Involving Human Subjects. It has been modified at a number of subsequent WMA meetings. It is not to be confused with the Helsinki Accords, (Aug. 1, 1975), a major diplomatic agreement signed in Helsinki, Finland, at the conclusion of the first Conference on Security and Cooperation in Europe (CSCE).

**HEMATOPOIETIC :** See also STEM CELLS.

**HEMIZYGOTE:** Refers to the state of genes located on the sexual chromosomes. In males, genes on the X chromosome are hemizygous, and will always be expressed as if they were dominant. In females, if one X chromosome exhibits a deletion, then the genotype of the corresponding gene on the other chromosome will also be hemizygous. (GK)

**HEPATITIS:** Causes liver disease. Three main types of viral hepatitis, Hepatitis A (HAV), B (HBV) & C (HCV). There is transmission of

HAV through food, water and shellfish; HBV through exchange of body fluids, blood or blood products, contaminated needles. Sexual intercourse can spread the disease. HCV- through transfusion. (JA)

**HERACLITUS** (c. 500 BC) Believed that fire is the primary element, perhaps as a metaphorical expression of his most famous doctrine, viz. that all things are in a constant state of change. You cannot even step into the same river twice. Reflecting on his doctrine might help us learn to cope with the fundamental changes which biotechnology is making to our world. Perhaps learning to live sanely and ethically in a radically changing world is a more realistic goal than deciding what to permit and what to forbid. (see QUANTUM THEORY ) (FL)

**HERB** : defined botanically as a non-woody plant that dies down to the ground after flowering but the term 'herb', in its wider definition, can be applied to any plant, part or whole, which has been used for such purposes as medical treatment, nutritional value, food seasoning, coloring or dying of other substances. (See HERBALISM, BUSH MEDICINE). (IP)

**HERBAL MEDICINE**: is the use of plant products (seeds, roots, stems, fruits and flowers) for either preventative health or therapeutic purposes. Herbs in this usage are not restricted to those plants classified botanically as herbs, rather it includes all plants. Herbal medicine is also known as botanical medicine, phytotherapy, phytomedicine and may be used either alone or more commonly as an integral part of another complementary therapy, for example as part of naturopathy, traditional Chinese and Ayurvedic medicine. (See HERBALISM, HERB, BUSH MEDICINE). (JW).

**HERBALISM** : the knowledge and study of herbs. Historically the most important uses of herbs were medicinal in the treatment of injuries and diseases. Separately or in herbal combination *Homo sapiens* has used internal and external remedies prepared from plants, animals and minerals which were typically used in conjunction with sorcery, prayer, music, crude operations and psychological therapy. Just as we learned by instinct and generations of trial and error that some plants were good to eat and others could cause poisoning and death, prehistoric humans gained the knowledge that certain plants were useful for treating illness. In the written record, the study of herbs dates back over 5000 years to the Sumerians, who described well established medicinal uses for such plants as laurel, caraway and thyme. The first known Chinese herbal remedies date from 2700 BCE and list 365 medicinal plants and their uses. The Egyptians of 1000 BCE are known to have used garlic, opium and castor oil and botanists of later centuries were similarly influenced by pre-existing insights. The Greek book that founded the science of botany - Theophrastus' '*Historia Plantarum*' -written in the fourth century BCE is part of this continuum of knowledge. (See HERBAL MEDICINE, HERB, BUSH MEDICINE, GINSENG, POISON HEMLOCK). (IP)

**HERBICIDE TOLERANT PLANTS**: A able to withstand the action of a herbicide which can kill the plant normally. (JA) *Examples*

**HERBICIDES** : Composition of word from cide= kill. A poison, compound capable of killing a plant, used in weed control. For example, wide spectrum (Roundup) and narrow spectrum, specific to some plants without endangering the ecosystem. There are two main mechanism:, 1. Interfering with energy metabolism Eg. Monuron; 2.defoliation E.g. di and tri chlorophenoxyacetic acid. (JA)

**HEREDITY** : (Latin *hereditas* 'inheritance') is embedded within the DNA of each chromosome where the genes or gene combinations function as a 'unit of heredity' specifying particular traits such as eye colour. Heredity offers an explanation as to why members of one family develop, for example, diabetes, cancer or arthritis at a relatively early age while members of another family are not afflicted until much later or not at all. (See HEREDITARY DISEASES). (IP)

**HEREDITARY DISEASES** : pertaining to a characteristic inborn ailment transmitted from parent to offspring. Couples have an elevated concern if they had already given birth to an infant with an obviously hereditary trait present in the family; however, parental age (both male

and female), ethnic background and certain reproductive difficulties may elevate the risk of certain genetic diseases. Unfortunately risks can only be stated in hard statistical terms but an informed decision about having children or not can only be reached when all the available facts are known. (See HEREDITY). (IP)

**HERITAGE:** The inheritance bequeathed upon following generations. Heritage may be personal, for example the genetic characteristics, material possessions or social status into which an heir is born. Heritage may also be collective, for example the cultural traditions, historical monuments and conserved natural areas which are the inheritance of the global society. (See WORLD HERITAGE, NATURAL HERITAGE, CULTURAL HERITAGE) (MP)

**HEROIC TREATMENT :** Use EXTRAORDINARY TREATMENT.

**HEROIN :** Heroin is one of a group of drugs known as 'opiates' (sometimes called 'narcotic analgesics'). Other opiates include opium, morphine, codeine, pethidine and methadone. Heroin and other opiates are highly addictive 'depressant' drugs, which physiologically slow down the activity of the central nervous system and the messages going to and from the brain and body. Alcohol and cannabis are also depressant drugs. Using heroin while pregnant is harmful as the habit risks intrauterine growth retardation, miscarriage and premature labor. Additionally, these underdeveloped drug-dependent babies suffer withdrawal and are at increased risk of SIDS; thus, these babies may require special neonatal hospital care. (See METHODONE, MORPINE, INTRAUTERINE GROWTH RETARDATION, RECREATIONAL DRUGS, ADDICTION). (IP)

**HERPETOLOGY:** (Greek: *herpet* *ón* "reptile" + *logos* "reason") The scientific study of reptilian and amphibian life. Herpetologists investigate the physiology, ecology, behavior and classification of reptiles and amphibians. (MP)

**HETEROGENEOUS :** Consisting of different parts; not of the same kind of nature. (BP)

**HETEROGRAFT :** See XENOGRAFT

**HETEROSEXUAL:** an individual's disposition to feeling love, or have sexual relations with, persons of the opposite sex [Greek *heteros* other] (see HOMOSEXUAL). (IP)

**HETEROSEXUAL-HOMOSEXUAL BEHAVIOR RATING SCALE:** an arbitrary gradation developed by Kinsey and his colleagues in the US for measuring the degree of heterosexuality and homosexuality by categorizing an individual into one of seven classifications according to sexual behavior and interest (see QUEER THEORY). (IP)

**HETEROTROPHS:** (Greek *heteros* 'different' + *trophe* 'food') Are organisms (e.g., animals) that obtain their external source of energy from foods - complex organic substances that were synthesized by other organisms (Greek *heteros* different + *trophe* food). (Contrast AUTOTROPHS) (IP)

**HETEROZYGOTE :** Hetero other than/different; All the cells of an organism have two copies of the same gene. When both genes are different from each other then this condition is referred to as heterozygous condition. (JA)

**HETEROZYGOUS:** Having two different alleles at the same point on a pair of chromosomes. (DM)

**HEURISTICS:** Decisions made by 'educated guesswork' for problem solving in a situation of uncertainty. A 'heuristic method' is investigative and may involve iterative processes and incremental searches which follow probabilistic rules to minimize the search area. (See FUZZY LOGIC, ITERATIVE PROCESS, UNCERTAINTY) (MP)

**HFEA :** Human Fertilization and Embryology Authority, United Kingdom.

**HGAC :** Human Genetics Advisory Commission, United Kingdom.

**HGC :** Human Genetic Commission, United Kingdom.

**HIERARCHY THEORY:** See SYSTEMS ANALYSIS.

**HIGH POWER MICROWAVES:** A recently developed military technology which involves a sudden massive pulse of microwave energy designed to fry electronic circuitry. Weaponized by incorporation onto Tomahawk cruise missiles, high power microwaves act in a similar way to a lightning strike by disabling the computer or communications devices necessary for the deployment of enemy technology. (See NON-LETHAL WEAPONRY) (MP)

**HIPPIES:** At many times, there have been rebels against the established social and economic systems. Often they may have gone unnoticed. But sometimes they have attracted much attention and even made an impact on history. At the time of the Protestant Reformation in Europe, and in particular the revolt of Cromwell and the Parliamentary sect against the monarchy and the established Church in 17th century England, the Seekers and the Diggers were influential radical sects. The Seekers wandered the British Isles, seeking after truth. The Diggers, believing that land was given by God for the benefit of all humans, and that the accumulation of land in the hands of the nobility and the church was a form of theft from the people, went out and simply cultivated and grew foodstuffs on unused land which supposedly "belonged" to the Church and to the nobility. Not long thereafter in North America, there were various communes. Some, like the Shakers, were religiously oriented. Others, like the Oneida Community were more free. In the East, too, there have been wandering religious pilgrims in India, as well as ashrams where a simple communal life is lived in renunciation of the materialism, greed and competition of society. The Taoists in China are an other example.

The Beatniks in 1950's America, and the Hippies in the 1960's and 70's, were simply a development of this old tradition. What was unique to the Hippies was the opposition to the war in Vietnam, to capitalist exploitation, and to environmental pollution. There were movements to stop war by putting flowers into the riflebarrels. This "Flower Power" was beautiful if naive. There was also much Nudism (q.v) both as a form of social protest, and as an attempt to break free of social convention and to start afresh as if in a metaphorical New Garden of Eden. Free Love was also encouraged, and was much easier to practice in those days before HIV became a major epidemic. And there was a movement of serious, hardworking "back to the landers", who left the military-industrial society to start an alternative society on homesteads and communes, often in clearings within heavily forested areas. Their ideas of organic agriculture were then considered radical, but are recognized today by many people as being environmentally and nutritionally sound.

People tend to forget history, and the Hippies were quite unaware of their roots in the radical thinking of the Protestant Reformation and among the American Colonists. They were not aware that many of their ideas of freedom were almost identical to those which contributed to

the American Revolution against the British. If the hippies had used Thomas Jefferson as their figurehead, rather than Mao Tse Tung and Ho Chi Minh, they might have won their revolution. (FL)

**HIPPOCRATES** c460-377 BC Greek physician and philosopher.

**HIPPOCRATIC OATH** an oath of ethical professional behavior sworn by new physicians, attributed to Hippocrates, but thought to be written by followers of Pythagoras. (DM)

**HIROSHIMA** : see ATOM BOMB.

**HISTOCOMPATIBLE**: The condition in which tissues will not react to produce a rejection during transplantation. (DM)

**HISTOCOMPATIBILITY ANTIGENS**. Proteins on the cell surface of virtually any nucleated cell, that can behave as antigens when organs or tissues are transplanted from a donor to a host. The immune system from the host might recognize these proteins as foreign, and mount an immune response against the cell surface proteins from the donor. (See also HLA GENES and MAJOR HISTOCOMPATIBILITY COMPLEX.) (GK)

**HISTOGRAM** : A statistical graph that represents, by the height of a rectangular column, the number of times that each class of result occurred in a sample or experiment. The weather chart as shown on TV is typically in histogram form. (See BAR CHART, GRAPH). (IP)

**HLA LOCUS CLASS I , CLASS II & CLASS III GENES** : Immune response genes from the Major Histocompatibility Complex. Class I (HLA-A, B and C genes) encode cell surface proteins expressed on nucleated cells. The protein forms a heterodimer with another protein,  $\beta_2$ -microglobulin, encoded on chromosome 15. Class II genes (HLA-DR, DQ, DP) encode membrane proteins found mainly on B lymphocytes. The two polypeptides ( $\alpha$  and  $\beta$ ) fo humoral response. (GK)

**HIV**: Human immunodeficiency virus, a causative agent in the disease *AIDS* . (DM)

**HIV SEROPOSITIVITY** : Development of neutralizing antibodies in persons who have been exposed to the human immunodeficiency virus (HIV/HTLV-III/LAV); linked to development of the acquired immunodeficiency syndrome (AIDS) and AIDS-related complex. (DM)

**HOLISTIC MEDICINE** is based on the belief that good health is a result of the integration of the physical, spiritual, social and emotional components of life. The aim of holistic medicine is the promotion of optimal health. Holistic medical systems may encompass religion, health education and complementary therapies, and do not exclude use of conventional or orthodox treatments. However it should be noted that within some groups holistic medicine is used interchangeable with both complementary and alternative medicine. Holistic medical systems may include such practices as naturopathy, herbal medicine, massage and other physical therapies, acupuncture, homeopathy and meditation and well as spiritual belief systems (see COMPLEMENTARY & HERBAL MEDICINE). (JW)

**HOLY BIBLE**: See BIBLE, OLD TESTAMENT, NEW TESTAMENT, QURAN.

**HOME CARE** : Care of a patient at home, by family members and/or health personnel. (See AGED, HOSPICE). (DM)

**HOMO ECONOMICUS**: See SUSTAINABLE DEVELOPMENT.

**HOMO NEANDERTHALENSIS**: The biological name for Neanderthals.

**HOMO SAPIENS** The biological name for the human species.

**HOMO SUSTINENS**: See SUSTAINABLE DEVELOPMENT.

**HOMOEOPATHY** is a therapy developed by Samuel Hahnemann in the late 1700. This treatment is based on the Law of Similiars, a law that states "like cures like" ie. a disease or symptoms caused by a particular substance can be cured by minute doses of the same substance.

Homeopaths claim that "potentization" (a combination of dilution and vigorous shaking of the substance) are critical to the effectiveness of homeopathic remedies. The higher the dilution of the substance the more potent it is said to be. Homeopathy dilutions are usually indicated by either a D or X (1:10), or a C (1:100) - hence a potency of 6X results in a final dilution of 1 in  $10^6$  (1:1,000,000). Considerable debate has occurred in the scientific and medical community as to whether there is any scientific basis for homeopathy and results of clinical trials and other studies have proven inconclusive (see Ayurvedic Medicine & Holistic Medicine). (JW)

**HOMEOSTASIS** : 1. a system that maintains a dynamically stable state by internal regulation similar to a thermostat governing the temperature of a room. 2. the ability of the body to support life by keeping the internal chemical environment constant within a normal range of values. Physical harmony and mental balance are based on adaptive resilience to change - especially significant in complicated social animals such as ourselves. (See ALLOSTASIS, GENERAL ADAPTATION SYNDROME, GAIA HYPOTHESIS). (IP)

**HOMOGENOUS** : Of the same kind of nature, or consisting of the same parts. (BP)

**HOMOGRAFT** : See ALLOGRAFT

**HOMOLOGOUS RECOMBINATION**: A process of DNA exchange where introduced DNA is substituted for native DNA containing identical or very similar (homologous) nucleotide base sequences at the edges of the exchanged regions. (DM)

**HOMOLOGOUS SEQUENCE**: Nucleic acid segments having an identical or nearly identical linear order of nucleotide base pairs. (DM)

**HOMOLOGY**: Degree of relatedness in appearance, function, or structure. (DM+GK)

**HOMOZYGOTE** : Homo= same. All the cells of an organism have two copies of the same gene. When both the genes are different then this condition is known as homozygous condition. (JA)

**HOMOZYGOUS**: Having identical alleles at the same point on a pair of chromosomes. (DM)

**HOME BOX**: A short stretch of nucleotides whose sequence is virtually identical in all the genes that contain it. It has been found in many organisms, from fruit flies to human beings. It appears to determine when particular groups of genes are expressed in the development of the fruit fly. (DM)

**HOMOPHOBIA** : The irrational fear and hatred of homosexuals and homosexual behavior. It may also indicate a fear of being gay. Prejudices toward lesbians and gay men may often operate with societal and religious sanction in order to keep in place heterosexism and its procreative potential. Feminists insist that homosexual oppression must be understood within the broader framework of patriarchal sexism. Alternatively, many of these hostile attitudes are erroneously embedded in beliefs and assumptions of how nature operates and what is 'natural' human L ORIENTATION; SEXUAL IDENTITY; BIOSCIENCE ETHICS). (IP)

**HOMOSEXUAL** a disposition to feeling love, to have sexual relations with, persons of the same sex, worldly concern for justice since dualism in the understanding of moral and natural law; e.g., historically Judaism, Christianity, Islam condemn homosexual acts conflicts with liberal view [Greek *homos* same]. (See SEXUAL ORIENTATION; HOMOSEXUALITY). (IP)

**HOMOSEXUALITY** : a disposition to feeling carnal love for, or having sex with, persons of the same gender. Sexual orientation has



generated ethical concern where a failure to reconcile the domains separating human-made (moral) law and evolutionary (biological) understanding perpetuates a cycle of violence and discrimination. Historically Judaism, Christianity and Islam condemn homosexual acts, however, opinions on "pederasty between males" conflicts with ancient and modern liberal points of view. For example, from the 6<sup>th</sup> to the 4<sup>th</sup> century BC the term "pederasty" [Greek *paidos* boy + *erastes* lover]described a kind of friendship where an adolescent male youth received an education from an assigned older companion. The adult gave advice and all knowledge he possessed from his education and experience to the adolescent and was reimbursed, in turn, by the enjoyment of the adolescent's beauty and grace - but not completely devoid of erotic expression or tender caress; that ithe ethical perspective, homosexuality had its own special character strictly maintained on and the elevation of social and personal values [Greek *homos* same] (see LESBIAN/ISM; QUEER THEORY; EROS; APHRODITE). (IP)

**HOPE:** look forward with expectation for a particular desire or outcome to happen. The notion of hope is dominant in human nature where it is expressed in our thoughts, behavior and everyday speech - " *hope that you're well* ", " *here's hoping* " - and so on. Much has been written about the nature of hope which can also be found in myths such as the Greek story of Pandora's box. Pandora, a beautiful woman fashioned by the gods out of clay and water, was sent down by Zeus in order to punish the mortals for Prometheus's act of stealing fire. She came with a vase (sometimes represented as a box) but was warned on no account to open it which, out of curiosity, she did. As she opened the container all the terrible afflictions that blight human beings - famine, physical sickness, insanity, old age, vice, lust etc - spilled out before she could quickly closed it leaving only hope trapped inside. Why was hope left in the vase? One meaning of this myth may be that hope is always embedded within disasters because the benevolent side of the gods saw that humanity needed to hold onto hope. Our task is to turn hope into realistic plans for the future that will alleviate our troubles and 'hopefully' prevent their recurrence. Hope, if outward looking, creates new possibilities and contributes to psychological maturation but when it turns away from reality favoring illusion and indulgence, it remains immature and cannot enhance adaptive survival (see ALLOSTASIS, LEARNED HELPLESSNESS and WELLBEING). (IP)

**HORIZONTAL TRANSFER:** The passage of genetic material from one organism to another via nonsexual mechanisms. (DM)

**HORMONE:** Chemical substances produced in one part of the body that affect an organ or group of cells in another area of the body. (DM)

**HORMONE MIMICS OR DISRUPTORS** See SYNTHETIC HORMONE DISRUPTERS.

**HORTICULTURE** : A branch of agriculture, the scientific cultivation of commercially important fruits, vegetables, ornamental plans, spices and herbs. (JA)

**HOSPICE:** Facilities and/or services that provide palliative and supportive care for terminally ill patients and their families. A multidisciplinary system of family-centered supervision designed to assist the terminally ill person through the phases of dying. Hospice care includes home visits, professional health care, education, emotional support for the family, physical care of the patient, and may be provided in the center or at home. A major landmark in society's increasing perceptiveness of the true nature of death was the publication of the book *On Death and Dying* by Elisabeth Kÿbler-Ross, M.D. Following her lead, a general awareness, including our bioethical responsibility to the dying has matured - prior to that time death was the sole province of the priest and doctors were expected to concentrate on the living. (Latin *hospes* host). (IP)

**HOTSPOTS:** is the most ecologically sensitive area requiring high preservation priorities, with high species richness with rare species, e.g.

tropical rain forest, such areas are prone to species loss. - 25 identified hot spots worldwide, India has two, The Eastern Himalayas covering a length of 3,500 Kms and the Western Ghats with a length of 1,600 Kms. (JA)

**HUBBLE TELESCOPE:** Orbiting satellite telescope launched in 1990, the Hubble Space Telescope was named after astronomer Edwin Hubble, the discoverer of galactic recession. (See SATELLITE, COBE) (MP)

**HUGO:** Human Genome Organization, an international body to coordinate efforts to sequence the human genome (see *human genome project*). (DM)

**HUMAN:** To a biologist, a member of the species *Homo sapiens*. Also used as a near synonym for a person, i.e. a moral agent. (MR)

**HUMAN BODY CELL TYPES :** A collection of similar types of cells forms an organ and a collection of different organ systems constitute a body. In human body there are about 260 different cell types like the nerve cell, skin cell, kidney cell and heart cell. All different cell types work together to make the human body a functional whole – which is a best example of “systems approach”. (JA).

**HUMAN BEHAVIORAL ECOLOGY :** the branch of evolutionary ecology concerned with tracing the link between ecological factors and adaptive behavior. This anthropological approach to the evolutionary analysis of human behavior crystallized during the 1970s with E.O. Wilson *Sociobiology* (1975) and Richard Dawkins *The Selfish Gene* (1976) (see SOCIOBIOLOGY; EVOLUTIONARY PSYCHOLOGY AND DUAL INHERITANCE THEORY). (IP)

**HUMAN DEVELOPMENT INDEX:** An indicator of expected quality of life which combines four statistical indices: annual economic output, average life expectancy, adult literacy rate, and education enrolment. The HDI is published annually by the United Nations Development Programme, and enables rough national comparisons of social development with an emphasis on education. Variations on the index can differentiate between regions, genders and classes. (See GROSS DOMESTIC PRODUCT, GENUINE PROGRESS INDICATORS, INDEX OF SOCIAL HEALTH) (MP)

**HUMAN DIGNITY :** Substantially, the concept of human dignity bases on the teaching of the German philosopher Immanuel Kant (1724-1804), who ascribed “dignity” to any entity that does not have a price. This did not only include human beings (a kitten, for a person who loves her, does not have a price). “Human dignity” is the particular dignity that only human beings possess. The concept of “human dignity” also has its roots in religious dogmas which conceptualize human beings as having been created in the image of G-d. Therefore, they are something “worthy”, and should be respected by fellow human beings. Following Kant, a human being should never be treated as a means, but only as an end.

In most parts of the world, there is a wide consensus that every human being possesses dignity and should be treated with due respect and consideration. Nevertheless, critics are concerned with the diffuseness of the concept. The content of the term of “human dignity” is itself a mystery, for people in favour of advancing with medical research it is against human dignity not to use embryos for research that could lead to cures for fatal diseases). (BP)

**HUMAN ECOLOGY:** The branch of study which integrates the theories of sociology and ecology in order to explain human location, function and behavior in interaction with the environment. Such research elucidates human impacts on the environment as well as our reverse susceptibilities for example environmental pollutants created by us also return to impact the health of human populations. (See ECOLOGY, SOCIOLOGY, HUMAN BEHAVIORAL ECOLOGY) (MP)

**HUMAN EMBRYO :** See EMBRYO.

**HUMAN EXPERIMENTATION:** See CLINICAL TRIALS, and HELSINKI DECLARATION.

**HUMAN EXTINCTION:** It is amazing how little emphasis is placed on discussion and planning for the future survival of our own species. It seems as if, like an adolescent, we have not yet come to terms with our own mortality. In the long term, it is almost inevitable that our species will go extinct or be otherwise transformed by evolution or technology. Human populations have undergone massive expansion in a very short period of time from only 2 billion people in 1930 to currently well over 6 billion people, and the associated increase in human activity and consumption has precipitated the sixth Mass Extinction of global biodiversity. In ecology, unregulated increases in population size beyond the capacity of the environment to sustain them result in catastrophic decline. Habitat destruction and other ecological disturbances such as global warming have undermined the living systems upon which the health of the globe and our existence depend. Rapid changes to the composition of the atmosphere have caused global disruption before in the history of the Earth. Major epidemics are increasingly likely, due to the evolution of antibiotic-resistant or other new strains of disease and the ease by which microbes can travel across our international transport network. With the accelerating pace of change, future developments in technology and warfare may pose an even more immediate danger to the human species. Three technologies in particular have the potential power to devastate the Earth Genetics, Nanotechnology and Robotics. Each of these new technologies have a dangerous combination of characteristics, in particular the ability to self-replicate in a chain reaction with no upper limit, which place them in a league of destructiveness which may be on a scale larger than that of the Earth itself. Genetically engineered or nanotechnology weapons have the potential to be selectively destructive to certain regions or genetically distinct populations. Dangerously, the advent of the internet and the declining power of government regulation have placed these technologies within the reach of individuals and small groups rather than just nation states. The development of new technology often seems to move faster than our philosophical understanding of its consequences. Human survival may now depend upon globalising the culture of ethics to control the development and spread of dangerous information and technology. (MP)

**HUMAN FREEDOM INDEX:** An index proposed by the United Nations Development Programme to measure human rights and freedoms in different nations. The index indicates the presence or absence of 40 equally weighted rights and freedoms, including for example gender equality, homosexual rights, independent courts and freedom from torture. (See HUMAN DEVELOPMENT INDEX) (MP)

**HUMAN GENE THERAPY:** Insertion of normal DNA directly into cells to correct a genetic defect. An important biotechnological application for the treatment and prevention of genetic diseases. The first human gene therapy protocol began in September 1990 that successfully treated adenosine deaminase deficiency (ADA) disease. If gene therapy is adequately successful, it will revolutionize the medicine of the future and will have a profound impact on our moral and ethical outlook. (DM, IP)

**HUMAN GENOME PROJECT:** Collective name for several projects begun in the mid 1980's in several countries, following the USA Department of Energy decision to 1) create an ordered set of DNA segments from known chromosomal locations, 2) develop new computational methods for analyzing genetic map and DNA sequence data, and 3) develop new techniques and instruments for detecting and

analyzing DNA. (DM)

**HUMAN IMMORTALITY:** (See LIFE EXTENSION, AGING, TELOMERES, DOWNLOADED MINDS)

**HUMAN IMMUNODEFICIENCY VIRUS (HIV):** The virus causing AIDS.

**HUMAN PARTHENOTE :** It is a human egg which is artificially activated and it has been generated by ACT in USA. Human egg when artificially activated beings to develop with only one set of chromosomes derived from the mother. In a regular human embryo, the pronuclei of both the sperm and the egg unite at conception to form the zygote. In this respect the egg developed by parthenogenesis differs from a human embryo. Parthenote is also called parthenogenote or parthenogenone. (See PARTHENOGENESIS).

Since in a parthenote there is no conception and fertilization and zygote formation as in a regular human embryo a parthenote has no equal status with a human embryo. This ethical issue is debatable. Other bioethicist compare the human parthenote to a human gamete which is just a sex cell. The human stem cell under this condition still remains as a cell and not as a human organism As a result a difference in its "kind" can be perceived. Hence it is arguable that experiments using ACT's human parthenote is justifiable and its destruction at the end of an experiment is permissible. (JA).

**HUMAN REPRODUCTIVE CLONING:** production of a human fetus from a single cell (somatic or fertilized egg at two cell stage) by asexual reproduction. (JA)

**HUMAN RESOURCES:** See Resources.

**HUMAN RIGHTS:** A right is a freedom. Sometimes by "rights" we mean the freedoms which we actually have. Sometimes we mean the freedoms which we ought to have (ethical rights). In John Locke's (q.v.) philosophy - of which much was similar to ideas found earlier in John Milton's (q.v.) political essays -- ethical rights are freedoms to exercise duties. So for Locke the right to private property is a freedom needed to perform the God-ordained duty to live and settle the Earth. And the right to religious toleration is a freedom to exercise the duty to achieve religious belief. (FL)

**HUMAN RIGHTS DECLARATION :** See UNIVERSAL DECLARATION OF HUMAN RIGHTS.

**HUMAN RIGHTS LAW :** See INTERNATIONAL HUMAN RIGHTS LAW.

**HUMAN SUBJECT :** A living individual about whom an investigator (whether professional or student) conducting research obtains (I) data through intervention or interaction with the individual or identifiable private information. (JA)

**HUMAN WASTE:** Human wastes are biologically degradable components of sewage such as urine and feces which can affect the nutrient loading, dissolved oxygen, water quality and pathogen load of waterways. The term may occasionally be used more broadly to all human waste including industrial pollution and domestic rubbish. (See POLLUTION, SEWAGE, WASTE) (MP)

**HUMANISM:** An ethical system that emphasizes the welfare of human beings and the personal worth of each individual. Devotion to human interests and not concerned with religion. (DM)

**HUMANITARIAN:** One who professes humanism.

**HUME, DAVID (1711-1776):** Scottish historian and philosopher. In his philosophy of science he rejected mystical ideas of "power", "force"

and "causal necessity" and replaced them with laws of regularities in experience. His laws of causal regularity anticipated Koch's postulates and much of the logic of epidemiology. But mystical powers are now returning to health and bioethical thinking through the East Asian ideas of "ki" and "chi". In ethics he said that reason is and by right ought to be the slave of the passions and can pretend to no other office but to serve and obey them. Good and evil are nothing but positive or negative feelings which we have when we contemplate objects or actions. Although an atheist and a hedonistic lover of the good life, Hume's last days before his death of an extremely painful illness are a model of good cheer and positive thinking, as described in memoirs by his friends James Boswell and Adam Smith. They can be read with profit by those interested in end-of-life, palliative and hospice care. (FL)

**HUMOR** : Basic bodily liquid. In the Greek medical tradition, there are four humors in the body: blood, phlegm, yellow bile and black bile. The first to suggest this system of humors was apparently Empedocles (died after 444 bce). The four humors must be in balance for the person to be healthy. If an imbalance develops, this produces sickness, and the remedy is produced by "balancing out" the imbalance. That is, the treatment is designed so as to emphasize the humor opposite to the one which is in excess, thus returning the body to a state of balance. The four humors are also said to correspond to the four elements of ancient Greek belief (water, fire, air, and earth). According to this system, people are also said to be born with a tendency towards a particular humor. These birth types are: sanguine, phlegmatic, choleric, and melancholy. The four humor theory is central to the Unani medical system (see UNANI). (AG)

**HUXLEY, ALDOUS** : (1894-1963) Author of the novel "Brave New World". In this novel, Huxley expresses his concerns about a future society which is over-automated, and people are produced in factories according to the type of work they will be trained to do. The situation is shown to be extreme when factory-produced people show their disgust towards those who were born in a non-mechanical way, with words such as "father" and "mother" being considered swearwords. In addition, Huxley expresses concern in "Brave New World" over the use of drugs as a method of escape from reality. The ideas found in "Brave New World" are relevant to discussions on cloning, genetic engineering, automation of society, and many other topics of Bioethics. (AG)

**HYBRID VEHICLE**: The "hybrid" car uses the range and strength of petrol combined with the low emissions and fuel-efficiency of electric power. (MP)

**HYBRIDS** : The offspring of parents belonging to different species, varieties, or genotypes. (See CHIMERAS, TRANSGENIC ANIMALS) (DM)

**HYBRIDIZATION**: The process of joining two complementary strands of DNA, or of DNA and RNA, together to form a double-stranded molecule. (DM)

**HYBRIDOMA**: A new cell resulting from the fusion of a particular type of immortal type of immortal tumor cell line, a myeloma, with an antibody-producing B lymphocyte. Cultures of such cells are capable of continuous growth and specific (i.e. monoclonal) antibody production. (DM)

**HYDATIDIFORM MOLE**: A placental abnormality composed of grape-like clusters of chorionic villi that occurs in approximately 1 in 1500 pregnancies in the United States and eight times more frequently in some Asian countries and being more common in older and younger women than in those between 20 and 40 years of age. Molar pregnancies are diagnosed when abortion is threatened or in progress and are commonly the product of an abnormal fertilization, usually the fertilization of one ovum by 2 sperm which union results in an aggressive invasion of a potentially malignant placental tissue into the uterine endometrium. It is important that pregnancy be avoided for at least 1 year

during which time assays for chorionic gonadotrophin be performed to monitor for the risk of developing malignant gestational trophoblastic disease. (DM+IP)

**HYDRO ENERGY:** See HYDROELECTRIC POWER.

**HYDROELECTRIC POWER:** Hydro power is electricity generated from the potential energy of hydrological systems. The force of flowing water from a river or existing dam is used to drive an electricity generator. Although hydroelectric energy is renewable and produces no greenhouse gases, there may be ecological and even social problems arising from the construction of new large dams. (See RENEWABLE ENERGY) (MP)

**HYDROGEN:** Hydrogen is the lightest element, has atomic number one, and consists of one proton and one electron. The hydrogen gas molecule is highly flammable and consists of two covalently bonded hydrogen atoms. Isotopes of hydrogen are deuterium and tritium, with one and two neutrons respectively. Water is composed of two hydrogen atoms and one oxygen atom. Hydrogen can be a source of power, ranging from the hydrogen fusion bomb to automobile fuel. (See HYDROGEN BOMB, ELEMENT) (MP)

**HYDROGEN BOMB :** Uses the nuclear fusion process to release vast amounts of energy. As extremely high temperatures are required for the process to occur, these temperatures are obtained by an atomic bomb around which the fusion material is arranged to initiate the process involving hydrogen isotopes deuterium and tritium (see ATOM BOMB, NUCLEAR FISSION, NUCLEAR FUSION). (IP)

**HYDROLOGICAL CYCLE:** See WATER CYCLE.

**HYPERACTIVITY:** Attention-deficit/hyperactivity disorder (ADHD) is a behavioral syndrome characterized by inattention and distractibility, restlessness, inability to sit still, and difficulty concentrating on one thing for any period of time. ADHD is most common in children, and is three times more common in males than in females ,and occurs in approximately 3 to 6 percent of all children. Although behaviours characteristic of the syndrome are evident in all cultures, they have garnered the most attention in the United States, where ADHD is the most commonly diagnosed childhood psychiatric disorder. It was not until the mid-1950s that American physicians began to classify as “mentally deficient” individuals who had difficulty paying attention on demand. Various terms were coined to describe this behaviour, among them *minimal brain damage* and *hyperkinesis* . In 1980 the American Psychiatric Association (APA) replaced these terms with *attention deficit disorder* (ADD). Then in 1987 the APA linked ADD with hyperactivity, a condition that sometimes accompanies attention disorders but may exist independently. The new syndrome was named ADHD. (DM)

**HYPERCHOLESTEROLEMIA :** is an inherited abnormality resulting in sustained high blood-cholesterol levels, leading to premature death from heart diseases. (JA).

**HYDROSPHERE** refers to the layer of water which nearly envelopes the Earth, in the form of oceans and inland seas (see BIOSPHERE & LITHOSPHERE). (IP)

**HYPERTHERMIA :** Excessive high body temperature accompanied by quickening of the pulse and disturbance of other bodily functions. Maybe caused by physical environmental conditions or fever inducing pathogens. (See ANAEROBIC EXERCISE). (IP)

**HYPNOSIS:** (Greek *hypnos* 'sleep') an altered state of mind or consciousness likened to daydreaming, yoga, zen and transcendental meditation but also apart from these owing to the hypnotic trance's 'anesthetic' powers where it becomes possible for doctors to perform

surgery on their patients without the use of other analgesics. The remarkable powers of hypnosis were recognized and used to treat illness, disease and pain removal for over 3,000 years until the early Christians drove it into oblivion because they feared its force and misunderstood its source; thus, attributed the practice to the work of supernatural beings. Today hypnosis is recognized as a safe, albeit strange, aid in the practice of medicine, dentistry and psychology. (See HYPNOTHERAPY). (IP)

**HYPNOTHERAPY** : (Greek *hypnos* 'sleep' + *therapieia* 'treatment') the treatment of disorders with the aid of hypnosis. Hypnotherapy takes advantage of the unique characteristic of the unconscious mind in which suggestions are not only more readily accepted than in the waking state but are also acted on much more powerfully than would be possible under normal conditions. Hypnotherapy, when practiced by doctors specifically trained in its use, has been approved by the principal medical associations of many western countries including Britain, Australia and the United States, and also in many eastern bloc countries, particularly the former Soviet Union where it has been traditionally an integral part of the health care system. While the hypnotherapist guides the patient into their trance, it's the patient's own thoughts and unconscious mind that undertakes the healing process. Given the overall success rates of hypnotherapy, one has to compare this with the adverse side-effects and possible dangers of many prescribed pharmaceuticals, particularly when taken over extended periods of time. Unfortunately, however, pronounced drug addiction does not respond perfectly to hypnotherapy - perhaps due to the process of addiction itself which affects the unconscious mind so profoundly. (See HYPNOSIS). (IP)

**HYPOCHONDRIA**: From the Greek for abdomen (thought to be the seat of melancholy), hypochondria is an obsessive preoccupation with one's health and morbid false sensation and expectation of disease. (See MEDICAL INFORMATION DIRECTORIES, SELF-FULFILLING PROPHECY) (MP)

**HYPOCRISY** : Hypocrisy is the promotion of moral values which are contrary to the real character, standards and behaviors of the hypocrite. For a long time a cause of public disillusionment, hypocrisy has commonly been alleged against commercial, political and religious institutions. Hypocrisy on the part of the advocator or deliverer of moral advice cannot be used as a valid argument against the advice itself. Nevertheless, the person who practices what they preach is more likely to be heard than is the hypocrite. (See HYPOCRITE) (MP)

**HYPOCRITE** : The hypocrite promotes and pretends certain values and behaviors but is unwilling or unable to live up to these standards. (See HYPOCRISY) (MP)

**HYPOTHESIS**: Supposition open to refutation. Knowledge, especially in **SCIENCE** (q.v.) largely accumulates by the testing of hypotheses which leads to some being rejected and others accepted. (MR)

**HYPOXIA** : (Greek *hypo* 'deficient' + *oxys* 'sharp' + *genein* 'to produce'). Inadequate oxygen supply at the cellular level. If the supply of oxygen is inadequate for aerobic cellular metabolism energy is provided by less efficient anaerobic pathways that produce toxic metabolites. The tissues most sensitive to hypoxia are the brain, heart, pulmonary vessels, and liver. Despite the evolution of adaptive mechanisms for the effective transport of oxygen, the fetus is still at risk when the oxygen level in the uterine environment falls. It has been suggested that oxygen deprivation may be responsible for more than 30% of the deaths of all stillborn infants and a major cause of intrauterine growth retardation (IUGR). (ASPHYXIATION, INTRAUTERINE GROWTH RETARDATION). (IP)

# I

<a href="#">A</a>	<a href="#">B</a>	<a href="#">C</a>	<a href="#">D</a>	<a href="#">E</a>	<a href="#">F</a>	<a href="#">G</a>	<a href="#">H</a>	<a href="#">I</a>	<a href="#">J</a>	<a href="#">K</a>	<a href="#">L</a>	<a href="#">M</a>	<a href="#">N</a>	<a href="#">O</a>	<a href="#">P</a>	<a href="#">Q</a>	<a href="#">R</a>	<a href="#">S</a>	<a href="#">T</a>	<a href="#">U</a>	<a href="#">V</a>	<a href="#">W</a>	<a href="#">X</a>	<a href="#">Y</a>	<a href="#">Z</a>
<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**IAEA** : International Atomic Energy Agency.

**IATROGENIC**: (Greek: *iatros* 'physician' + *genein* 'to produce') Caused by medical treatment, diagnostic procedure or exposure to the environment of a health care facility (Greek *iatros* physician + *genein* to produce). (IP)

**IBN SINNA** : (known in Latin as Avicenna) (980-1037 ce) Scholar, philosopher and physician. Ibn Sinna was the author of "al-Qanun" (Canon of Medicine), a comprehensive text on a wide range of medical topics. This text is central to the Unani system of medicine. (AG)

**ICBM** : The Inter-Continental Ballistic Missile (ICBM) is a land-launched missile able to carry conventional or nuclear warheads, usually with a range between 5500 and 20,000 kilometers, for example Russian 'SS-18' and US 'Peacekeeper' missiles. (See MISSILES, SLBM, MIRV, CRUISE MISSILE) (MP)

**ICC**: International Criminal Court

**ICE-MINUS (ICE-)**: A bacterium lacking a functional gene coding for a protein that promotes the formation of ice crystals by providing a physical nucleus around which ice crystallizes. The gene has been deleted from strains of Pseudomonas syringae Pseudomonas fluorescens, and Erwinia herbicola . (DM)

**ICE-PLUS (ICE+)**: A bacterium with an intact, functional ice-nucleating gene. (DM)

**ICSI** : Intracytoplasmic sperm injection, first used in 1993, has become the most powerful tool available to the reproductive andrologist for the treatment of severe male infertility. By means of ICSI, fertilization and pregnancies can be obtained with sperm recovered either from the ejaculate, or from the epididymis, or from the seminiferous tubules, irrespective of whether spermatogenesis is normal or deficient and irrespective of whether the underlying pathophysiology is understood or not. Biologically selected barriers which prevent abnormal gametes from penetrating the zona pellucida of the oocyte are low density, poor structure, abnormal or weak motility, immotility and dysfunctions at the level of binding with the zona. Some of these factors are now circumvented by sperm micromanipulation in conjunction with IVF technology. The technique involves injecting one sperm directly into the ooplasm of the ovum. Because ICSI needs only one sperm in order to fertilize an oocyte, most subfertile and infertile men; that is, men with either no spermatozoa in their ejaculate (azoospermia) or very few spermatozoa in their ejaculate (extreme oligozoospermia) can now father a child. However, the safety of micromanipulation and assisted



fertilization technologies is of concern. So far the majority of babies conceived as a result of ICSI seem healthy, but it is too early to determine the long-term consequences; particularly in relation to the potential reproductive capacity in the sons of sub- and infertile men. (See ASSISTED REPRODUCTIVE TECHNOLOGIES). (IP)

**ICHTHYOLOGY:** (Greek: *ichthyo*- "fish" + *logos* "reason") The scientific study of fish. Ichthyologists examine the physiology, ecology, behavior and classification of fish life. (MP)

**ICZM:** Integrated Coastal Zone Management.

**IDEA :** 1. A unit of information that represents an experience, feeling, or memory of perception of things physical or abstract, sensed or intuited, real or imagined. 2. A result of processing such units of information, alone or in combination with others. (RW) (See BEHAVIOUROME)

**IDEALISM:** The belief that ideals can be achieved, even if this does not seem likely to others. The belief in philosophy that objects in the world are ideas which only exist in the mind of God or people who see them. (DM)

**IDEAS PRODUCTION:** New ideas are often the combination of existing ideas or concepts, residing for example in the regions between established definitions or disciplines. New properties and possibilities emerge when actions, tools or memes are analyzed, merged or extended. Methods for the production of ideas include concept comparisons/combinations, conjunction of words, metaphor/metonymy, brainstorming sessions, stream of consciousness, lateral thinking, meta-analysis, recognition of patterns, deductive reasoning and creative inspiration. (See BRAINSTORMING, LATERAL THINKING, METAPHOR) (MP)

**Identical Twins:** See Twins/Twinning.

**IDENTITY :** On the individual level: The feeling of being one self. Although identity is multi-dimensional and often heterogenous, it is characterized as a feeling of being “one”, a idthink we are, it also emerges from drawing a boundary from what we are NOT, or what we do not WANT to be. On the collective level (“collective identity”), identity is a seat are the *raison d’etre* of the group. (BP)

**IDENTITY CRISIS :** An identity crisis arises when our feeling of being one inseparable entity is challenged or even being overthrown. This can manifest in not knowing who we are, where we belong to, or what we are not. In regard to collective identity, a crisis can emerge if the common grounds that hold a group of people (a family, a congregation, a nation) together are unclear, challenged, changing at a rapid pace. (BP)

**IDEOLOGY:** The term ideology was first used during 18th century Enlightenment, referring to a philosophical pursuit more closely related to its literal meaning - the ‘study of ideas’. Ideology tod ideas (which may also have some validity). Ideologies often end with an “ism”; for example capitalism, rationalism, liberalism, socialism, communism, anarchism. (See WORLDVIEW, PARADIGM) (MP)

**IGNORANCE:** Ignorance implies total lack of knowledge or understanding of the system or process under consideration, or even the very existence of the relevant element. We can’t study or understand what we don’t know about. Widespread individuHY) (MP)

**IIED:** International Institute for Environment & Development.

**IISD:** International Institute for Sustainable Development.

**IISS:** International Institute for Strategic Studies.

**ILLUSION:** A n idea or belief which is not true, or something that is not really what it seems to be. (DM)

**ILO:** International Labor Organization.

**IMF:** See **INTERNATIONAL MONETARY FUND** .

**IMMORTAL:** Living for ever. (MR)

**IMMUNE SYSTEM** : An extensive system that protects the body against pathogenic organisms and other foreign bodies. Lymphocytes which develop from stem cells in the bone marrow are associated with the protection of the body against foreign materials or antigens. There are two types of lymphocytes - the T-lymphocytes activated by the thymus gland and the  $\square$  -lymphocytes activated in the main in lymphoid tissues. When an activated T-lymphocyte encounters antigens they develop specific protective(in conjunction with phagocytes) of the specific antigen, and memory cells that multiply and remain in the lymphoid tissue passing on their latter is called cell-mediated immunity.  $\square$  -lymphocytes are activated by microbes ase while the memory cells confer humoral r cells and antibodies. In summary, theres T cells to mobilize tissue macrophages in the presence of a foreign body. (See IMMUNITY, AUTOIMMUNE DISEASE, DEPRESSED IMMUNE RESPONSE, JENNER, EDWARD. (IP)

**IMMUNITY** : (Latin *immunis* 'free'). The state of being protected against contagious agents. Immunity may be acquired naturally or artificially and both forms may be active or passive. Active immunity means that the individual has responded to an antigen and produced suitable antibodies. In passive immunity the individual has been given antibodies produced by someone else.

*Active artificially acquired immunity* develops in response to the administration of dead or artificially attenuated (weakened) microbes (vaccine) or detoxicated toxins (toxoids) which retain the antigenic properties to stimulate the development of immunity but they cannot cause the disease. Many bacterial infections are preventable by immunization like cholera, diphtheria, measles, mumps, poliomyelitis, smallpox, tetanus, tuberculosis, whooping cough. Active immunization against some infections confers life-long immunity; for example, diphtheria, whooping cough, mumps while in other infections the immunity may last for a number of year or for only a few weeks before revaccination is necessary. Age and nutrition are important in establishing and maintaining good immunity. In the elderly and when nutrition is poor the production of lymphocytes, especially  $\square$  -lymphocytes, is reduced resulting in an inadequate immune response.

*Passive naturally acquired immunity* is acquired before birth by the passage of maternal antibodies across the placenta to the fetus. The variety of different antibodies provided depends on the mother's active immunity. Passive immunity is reinforced after birth by antibody-rich colostrum in beast milk. Passive immunity is short-lived but acts as a good protection during the neonatal period when the infant is most vulnerable.

*Passive artificially acquired immunity* is acquired when ready-made antibodies in human or animal serum are injected into the recipient. The

source of the antibodies may be from an individual who has recovered from the infection, or animals, commonly horses, that have been artificially actively immunized. Antiserum is administered prophylactically to prevent the development of disease in people who have been exposed to the specific infection, or therapeutically after the disease has developed. (See IMMUNE SYSTEM, AUTOIMMUNE DISEASE, DEPRESSED IMMUNE RESPONSE, JENNER, EDWARD. (IP)

**IMMUNIZATION** See IMMUNITY.

**IMMUNOCONTRACEPTION:** Contraception using immunological barriers to contraception, e.g. anti-sperm antibodies. (DM)

**IMMUNODEFICIENCY:** The state of sub-standard expression of the immune system.

**IMMUNOGLOBULIN:** protein synthesized by the mature B lymphocytes to fight antigens. Immunoglobulins (Ig) are made up of two heterodimers, consisting of a light and a heavy chain. The assembly of these chains give rise to five classes of immunoglobulins (IgA, IgD, IgE, IgG and IgM) and several subclasses of IgA and IgG. There are two types of light chains, called kappa (κ) and lambda (λ), and nine types of heavy chains. The IgG class comprises either gamma 1 (γ1 for the IgG1 subclass), γ2 (IgG2), γ3 (IgG3) or γ4 (IgG4) chains; the IgA1 subclass has alpha 1 (α1) and the IgA2 γ2 heavy chains. The other classes have delta (δ) (IgD), epsilon (ε) (IgE) and mu (μ) (IgM) chains. The constant region is called the constant region, since it is almost identical from one antibody to the other within the same class or subclass. (see also ANTIBODY) (GK)

**IMMUNOSUPPRESSION:** That state of inhibiting the expression of the immune system.

**IMPACT:** An effect or change caused by some factor, for example a social or environmental impact which improves or deteriorates the wellbeing of people or ecology. Impacts may be positive or negative, primary (direct) or secondary (flow-on effects), immediate, gradual or delayed, may produce feedback, reinforce each other's momentum, act in combination (additive or multiplicative), may be dependent on limits or thresholds, be measurable. (See ACT, EFFECT, CAUSATION) (MP)

**IMPERIAL UNITS :** The system of measurements based on the yard and the pound that is still used in the United States of America. (See METRIC UNITS). (IP)

**IMPLANTATION:** The process by which the fertilized oocyte (zygote) becomes attached to the wall of the uterus (endometrium). It commences in the seventh day of human embryo development, and is completed by day 14. (DM)

**IMPRINTING:** When an event or experience becomes fixed in someone's memory or marked in some way on their appearance. In genetics, the DNA may be marked in a particular way to turn the expression off. (DM)

**IMPOSSIBILITY:** See LIMITS, INFINITY.

**IN-BUILT REDUNDANCY :** See PLANNED OBSOLESCENCE.

**IN UTERO GENE THERAPY :** In the 1990s scientists developed a technique in mice in which foreign DNA was transported intravenously to the developing embryo *in utero*. It was found that the maternal blood flow effectively transported the DNA through the placenta, opening up the way for somatic *in utero* gene therapy. These advances are significant because they foreshadow the use of *in utero* gene transfer in humans where specific target organs; such as the lung in the case of cystic fibrosis, could be targeted for therapy with the advantage of

arresting the genetic defect before it can severely damage target tissues and organs in affected children. The major hazard of somatic gene therapy, as with all experimental treatments, is that things could go wrong. The development of human fetal gene therapy, however, carries many more complex moral and ethical questions not least the issues of deliberate, or accidental, targeting of the germ-line cells with physiological/psychological consequences on future generations of children. Technical advances in germ-line genetic modification in unscrupulous hands raises the disconcerting issue of eugenics and designer babies. (See SOMATIC-CELL GENE THERAPY; GERM-LINE GENE THERAPY). (IP)

**IN VITRO** : Literally "in glass"; pertaining to a biological process or reaction taking place in an artificial environment, usually a laboratory. Referring to a process or reaction carried out in a test tube or culture disk Like carrying out fertilization in a test tube. (DM, JA)

**IN VITRO EXPERIMENTS** : Experiments carried out on tissue/cells/eggs/sperms samples separated from living animals. (Lit = in glass). (JA)

**IN VITRO FERTILIZATION (IVF)**: A technique of medically assisted conception (sometimes referred to as "testtube" fertilization) in which mature oocytes are removed from a woman's ovary and fertilized with sperm in a laboratory. (See EMBRYO TRANSFER, EDWARDS, STEPTOE, LOUIS BROWN).(OPEN)

**IN VIVO** : Literally "in the living"; pertaining to a biological process or reaction taking place in a living cell or organism. The process carried out in human body itself. (JA, DM)

**IN VIVO EXPERIMENTS** : Experiments that are carried out on living animals (Lit = in life) (JA)

**INCOME**: Money that is earned from doing work or received from investments. Income is a demographic factor that influences many social factors and health outcomes. (DM)

**INDEPENDENT VARIABLE**: In statistics, the variable or attribute acting as a reference and which is thought to affect or influence the *dependent* variable. (See VARIABLE, INDEPENDENT VARIABLE ) (MP)

**INDETERMINACY**: Indeterminacy is where the scientific or social context is not sufficiently understood to allow an answer to a problem to be determined. Knowledge may be conditional on the validity of uncertain assumptions or axioms, or the system may be too complex and have insufficient models and monitoring. (See IGNORANCE, UNCERTAINTY, UNKNOWABLE, VERIFICATION) (MP)

**INDEX**: 1. One of the most important sections of reference works, the index is an alphabetical listing at the back of the subjects, concepts and memes contained within and page references for easy access. (See READING) 2. In statistics, an index is a measure created from the combination of two or more variables. (See VARIABLE, SCALE, HUMAN DEVELOPMENT INDEX) (MP)

**INDEX OF SOCIAL HEALTH**: An aggregated measure of sustainable social well being and progress. The Index of Social Health was developed by Marc Miringoff at the Fordham Institute in New York (1996). It combines estimates of the following into a single score: infant mortality, child poverty, child abuse, teenage suicide, drug abuse, alcohol-related traffic fatalities, homicides, high school dropouts, unemployment, weekly wages, food stamp coverage, health cover, housing access, elderly health costs, elderly poverty and the gap between rich and poor. (See GENUINE PROGRESS INDICATOR, GROSS DOMESTIC PRODUCT, SUSTAINABLE DEVELOPMENT) (MP)

**INDICATOR:** An element or measure which has additional interpretive meaning beyond the measurement itself. (See ENVIRONMENTAL INDICATORS, INDICATOR SPECIES) (MP)

**INDICATOR SPECIES:** A species which plays a fundamental role in the ecosystem and is able to be monitored as a proxy indicator of broader environmental health. The species must be ecologically appropriate and representative, including its abundance, distribution, taxonomy, habitat specificity and life strategy. Appropriate choices of indicator species also include those with known sensitivity to particular pressures, those with pre-existing information and cross-regional comparability, and those which allow practical non-destructive sampling. Major examples include the defining habitat vegetation and any keystone species. Over-emphasis on species-level indicators is warned against however, as biodiversity concerns a range of biological scales from genes, through species, and on to the most important unit for conservation management ecosystems. (See ENVIRONMENTAL INDICATORS, KEYSTONE SPECIES, BIOLOGICAL SCALES) (MP)

**INDIGENOUS:** belonging naturally in an area; native, intrinsic, innate, not introduced [Latin *indigena* in + *gen* be born]. (IP)

**INDIGENIZATION:** The process and trend of popular return to previous cultural practices or beliefs, including re-affirmation of indigenous values and resurgence of religious faith. Indigenization is often a reaction in counterbalance to perceived encroachment of Western values, consumerism, relativism and power. Religious resurgence, often urbanized, strong-minded and anti-secular, is sometimes expressed at the introduction of new democracy to a country. During times of change people want the emotional and social support religion provides. Indigenization is not a rejection of modernization or development, but rather resistance against the globalization of culture. (See WESTERN DECLINE, MODERNIZATION, GLOBALIZATION, COLONIALISM) (MP)

**INDIRECT PROOF:** See PROOF.

**INDIVIDUAL SELECTION:** See GROUP SELECTION.

**INDIVIDUALISM:** Freedom, liberalism or the ethic of self-actualization. The idea that freedom of thought and action for each person is the most important quality of a society, rather than shared effort and responsibility. (DM)

**INDUCTION :** A form of reasoning from individual cases to general ones, or from observed instances to unobserved ones. For example, inductive reasoning may follow thus: 'if this species is not endangered, that species is not endangered ... therefore all species are not endangered'. Obviously, in this case the conclusion is not true even if the premises are. (See DEDUCTION). (IP)

**INDUCTIVE REASONING:** The process of discovering a general principle by reasoning from a set of facts. (DM)

**INDUSTRIAL RELATIONS:** The relationships and agreements between workers, unions, management and employers, including wage agreements, collective bargaining and workers' rights. (MP)

**INDUSTRIAL REVOLUTION:** Originating in the wind and wheel-power of medieval times, the Industrial Revolution began in earnest with the invention of steam power in 18th century England. Using steam, coal, electricity and machines, the age of large-scale mechanized industry had begun. Industrialization and mass-production techniques spread across the globe transforming the way humans live, from concrete and conveyor-belts to manufactured goods and motor vehicles. The Industrial Revolution also brought into being mass-resource extraction, industrial warfare, factory labor and sprawling urban landscapes. (See INFORMATION REVOLUTION, INDUSTRIALIZATION, INDUSTRIAL WARFARE) (MP)

**INDUSTRIAL WARFARE:** The Industrial Revolution spawned production-line efficiency in the development of bulk weaponry. The resulting commercial distribution and large scale of "industrial warfare" led to the massive death toll of the two World Wars and most wars since. The folly of industrial warfare is epitomized by the nuclear bomb and other weapons of mass destruction. It seems obvious that industrial warfare can leave no real winners if belligerent nations are willing to exchange civilian death, psychological damage, economic loss and environmental destruction. Ironically, the warfare of the future will be aimed at stabilizing the proliferation of these dangerous industrial warfare technologies and methods. For us to survive our own technology, future wars must always have the aim of peace, with information the challenging-ground rather than physical bombing of societies and ecologies. (See INSTITUTION OF WAR, PEACEKEEPING) (MP)

**INDUSTRIAL UNION:** An organization that represents the people who work in an industry, protects their rights, and discusses their pay and working conditions with employers. (DM)

**INDUSTRIALIZATION:** Steadily increasing national development of industries such as resource extraction, processing, production, manufacturing and construction. Countries should be aware that extensive industrialization comes with environmental and cultural costs and may not be a sustainable or sensible long-term strategy. (See INDUSTRIAL REVOLUTION, NEWLY INDUSTRIALIZED COUNTRIES, URBANIZATION) (MP)

**INFANT BIOETHICS COMMITTEE :** A committee which prescribes guidelines neonates (new born) with disabilities are provided with comfort. Many neonatologists face had situations and make difficult and disturbing decisions. The committee provides ethical solace in such situations. Its other functions include: 1. "Education of staff and parents on relevant ethical principles and provision of literature and resources. 2. Policy development and establishment of ethical principles. 3. Prospective review through consultation in cases being considered for selective non-treatment and resolution of disagreements among staff and families, and 4. Retrospective review of relevant medical records to determine the appropriateness of hospital policies and whether these policies are being followed". (JA).

**INFANT MORTALITY :** the statistical rate of infant death during the first year of life expressed as the number of deaths per 1,000 live births in any specified geographical area in a given period. Neonatal mortality (death within 28 days of life) accounts for approximately 70% of infant mortality. (See SUDDEN INFANT DEATH SYNDROME). (IP)

**INFANTS :** In the USA the age designation for humans 1-23 months old. (DM)

**INFANTICIDE:** The crime of killing an infant child. Sometimes related to gender discrimination when it is one particular gender that is killed. (DM)

**INFER:** To imply, or draw a conclusion from assumptions based on the implications of the evidence. (See INFERENCE) (MP)

**INFERENCE:** Reasoning which relies on correlation between two things, such that characteristics or implications of one are assumed also in the other. For example, inference from the part to the whole. (See INFER, STATISTICAL INFERENCE) (MP)

**INFERTILITY:** Inability of a couple to conceive after a long period (e.g. 12-24 months) of intercourse without contraception. A condition in a beings where they are not able to bear a progeny, defective sperm/ovum/reproductive system (see social infertility). According to WHO a

failure to conceive after at least two years of unprotected intercourse, it encompasses both sterility and sub-fertility, it is about 10% in industrialized countries (see SOCIAL INFERTILITY). (JA)

**INFERTILITY TREATMENT:** Many types (See ART) including hormonal, IVF, development of many embryos, one implanted in uterus, others frozen/discarded/researched. (JA)

**INFIBULATION:** See FEMALE GENITAL MUTILATION.

**INFINITY:** Endless. Among the entities thought of as infinite have been God, the universe, time, the points on a line, the set of all natural numbers, etc. The Indian philosopher, Sri Aurobindo, criticized monotheistic religions on the ground that they deny the infinity of God. By dictating only one concept of God, they actually limit God. Polytheistic religions, he argued, are more faithful to God's infinity by recognizing that God's greatness can only be approached through many gods, i.e. many different concepts of God, or many different ways in which God appears. (FL)

**INFORMAL SOCIAL CONTROL :** Restraints on behavior that are exerted through social pressure, for example, through mores, folkways, conventions, or public sentiment. (DM)

**INFORMATICS:** The study of the application of computer and statistical techniques to the management of information. In genome projects, informatics includes the development of methods to search databases quickly, to analyze DNA sequence information, and to predict protein sequence and structure from DNA sequence data. (See BIOINFORMATICS) (DM)

**INFORMATION:** Patterns or sequences of data organized in a way such that they have meaning in some system or process (e.g. DNA, computer programs). The opposite of information is "noise", or randomly sequenced data. (See DATA, KNOWLEDGE, INFORMATION THEORY) (MP)

**INFORMATION OVERLOAD:** A glut of information such that effective analysis and decision-making are made more difficult. Information overload is a typical characteristic of the internet. (MP)

**INFORMATION SUPERHIGHWAY:** A descriptive term whose usage has declined where instant access to information has become normal and commonplace. The information superhighway is a metaphor illustrating the vast volumes of data and information able to be summoned across the internet and other electronic media channels. (See INFOSPHERE, INTERNET, CYBERSPACE) (MP)

**INFORMATION TECHNOLOGY (IT):** Computer technology for the production, storage, manipulation and communication of information. Most commonly framed within a business context, information technology may also be usefully applied to environmental management. (See KNOWLEDGE ENGINEERING) (MP)

**INFORMATION THEORY:** Mathematical and other theories concerning the nature of information and its recognition from noise, and the carrying capacities of different channels of communication. (MP)

**INFORMED CONSENT:** Informed consent can be coerced, but the principle of Autonomy (q.v.) would demand that it be freely given by patients in all cases of treatment or medical experimentation. Hospitals frequently demand that patients sign informed consent forms before receiving treatment, but it may be questioned whether the purpose is to uphold the ethical rights of the patient, or rather to protect the hospital in case of legal proceedings for error. The right to informed consent can be overridden if the patient's life or health are in clear and immediate

danger and the patient is temporarily or permanently incompetent to decide for oneself. There are many difficult borderline cases in pediatric, psychiatric, geriatric and emergency medicine. It can be questioned whether any patient in a state of pain, fear or emotional pressure can really give free informed consent. The devices of advanced directives and living wills (q.v.), have been legalized in some countries in order to allow one to give or deny informed consent in advance of becoming incompetent. (FL)

**INFOSPHERE:** (Information + Sphere) The infosphere is the collected data and information in cyberspace and different forms of media from which resources for research, decision-making and human knowledge can be drawn. It is ultimately information which illustrates and determines how energy acts upon matter in the course of the Earth's progress. (See NOOSPHERE, INTERNET, CYBERSPACE, BIOSPHERE, ANTHROPOSPHERE, COLLECTIVE MEMORY) (MP)

**INFRASTRUCTURE:** The basic systems and services, such as transport and power supplies, that a country or organization uses in order to function. (DM)

**INHERITANCE:** Genes that you receive from your parents. Also money or objects that someone gives you when they die. (DM)

**INHERITED DISEASE :** See HEREDITARY DISEASES

**INHIBITORY :** In biochemistry, compounds which block the action of enzymes. Inhibition may be either reversible or irreversible. (IP)

**INJUSTICE** occurs when some benefit to which a person is entitled is denied without good reason or when some burden is imposed unduly. (JA)

**INSANITY :** (Latin *in* 'not' + *sanus* 'sound'). Unsound or disturbed mental functioning - mental illness. Was formerly equated with psychosis but is now a medico-legal term signifying a person who is unfit to plead in a court of law. Causes if insanity maybe twofold or a combination of both: 1. Organic disorders of degenerative or hereditary etiology; such as schizophrenia, forms of dementia and 2. affective disorders which include psychoneurosis characterized by severe depression, anxiety and drug abuse. Insanity is not a simple condition or concept because the etiology is almost always multifactorial; that is, part genetic part socio-cultural where the individual's metabolic-hormonal characteristics adversely interact with environmental factors. (See PSYCHOSIS; DEMENTIA). (IP)

**Insecurity:** Insecure people lack confidence and are uncertain about their own abilities and about whether other people really like them. People may also have financial insecurity when they are not sure they will have the money for the future. (DM)

**INSECTICIDE :** A poison that kills insects. Include inorganic salts arsenicals, DDT- organochlorines and organophosphates hormones/pheromones and biological control, Integrated Pest management measures. (JA)

**INSECTICIDAL PROTEIN**

**INSEMINATION :** See DONOR INSEMINATION, DI, AID

**INSTINCT:** An innate (inborn) usually stereotyped behavioural response to one or more environmental stimuli. So, for example, even blind babies smile when pleased. In fact, though, practically all human behaviour, even if it has an instinctive component, is at least partly under its owner's control. (MR)

**INSTITUTION OF WAR:** a form of collective, institutionalized violence driven by planned strategies that maintain the structure of war. Aggression during wartime is termed institutionalized violence because, unlike individual aggression, it is driven by a diversity of carefully



planned strategies that maintain the structure of war. By institutionalizing war the hideousness of military conflict is not legislatively forbidden, as is infanticide, child abuse, torture, murder, rape and other forms of barbaric aggressive behavior during peacetime. On the contrary, these acts become pervasive cultural factors influencing the acceptability and aggrandizement of war. All cultures have sanitized war atrocities in fiction, art, film and the Internet; and warriors have always been glorified in secular and religious propaganda. Proof of the short-term profitability of war is everywhere, for example, the 1990s have seen more than 20% of the world's qualified scientists and engineers engaged in military research, while annual global military expenditure had exceeded worAUMATIC STRESS DISORDER). (IP)

**INSTITUTIONAL BIOSAFETY COMMITTEE (IBSC):** A committee in an institution to examine biosafety concerns. A competent authority constituted by an occupier or any persthe Institution, Scientists engaged in DNA work, a medical enuals/guidelines of the RCGM and make available copies to thS COMMITTEES). (JA, DM)

**INSTITUTIONAL REVIEW BOARD:** Sometimes called "IRB" or "Helsinki Committee", this is a body established by an institution -- a university, hospital, ministry of health or of science, a private or corporate industry, etc -- to review activities and proposed activities within the institution and to ensure that they meet certain ethical, scientific, or professional standards. A committee which supervises ethical and scientific quality of activities, especially research, within an institution. They usually deal mainly with human and animal experimentation, but environmental IRB's might also be considered. In order to avoid conflict of interest the committee should have members from outside the institution.

Sometimes hospitals and other institutions appoint people whose job it is to approve or disapprove proposals to conduct research within the institution, where the purpose is ensure that embarrassing facts are not discovered and published. Such people simply protect the self-interest of the institution and are not to be confused with IRB's. Hospitals and medical schools might have one IRB to oversee experimentation with human subjects, and another one to oversee animal experimentation.

It is difficult to establish an IRB with no conflict of interest whatsoever, because people who have sufficient scientific expertise to serve on the committee might naturally have an interest in seeing research proceeding unhindered. It is important, therefore, to include at least some non-professionals on the committee. (See HELSINKI DECLARATION) (FL)

**INSTITUTIONALIZED PERSONS :** Persons who stay in institutions such as prisoners, mentally sick persons, aged persons. There are concerns about how freely they can express consent. (DM)

**INSTRUMENTAL VALUE OF NATURE:** The allocation of value to ecosystems and the natural environment as a reflection of the products and services they provide towards human activity and wellbeing. The instrumental value of nature is a rather more concrete concept for economists than any intuitively-derived intrinsic values. Even denying the environment its own inherent moral value, instrumental value alone should be sufficient to engender careful conservation and stewardship. (See INTRINSIC VALUE OF NATURE, ENVIRONMENTAL VALUATION, USE VALUE, OPTION VALUE, BEQUEST VALUE) (MP)

**INSULIN :** See DIABETES MELLITUS.

**INSURANCE:** To insure is to protect yourself against risk by regularly paying a special company that will provide a fixed amount of money if you are killed or injured or if your home or possessions are damaged, destroyed or stolen. Insurance is an agreement in which someone pays a company money and they pay costs if the insured person/group have an accident, injury, etc. (DM)

**INTEGRATION:** to bring together segregated social communities into equal membership of the whole of society. It is essential in any

integration program that due recognition is given to the cultural settings in which kinship obligations, ethical values, religious beliefs, recreation may differ from the traditions of the wider community but are part of the whole community's heritage. Tolerance and acceptance of difference is a social ideal which is often broken to a lesser or greater extent; for example, in the Australian Aborigines speaking their indigenous language and had to conform to European ways. (IP)

**INTEGRATED MANAGEMENT:** Integrated management is handling, direction and control which takes into consideration a broad spectrum of potentially relevant or affected components of the environment including physical, ecological, social, cultural and economic factors. This outlook requires a wide-ranging view (large spatial scales), a long-term outlook (large temporal scale) and an integrated or holistic perspective (broad conceptual scale). Such vision is often lacking in the two most powerful global management entities; for example corporate management focuses too closely on economic values, and political management has a short-term election-based outlook. Integrated management recognizes the connectedness of human activities and natural processes, and necessarily involves multidisciplinary cooperation. The increased complexity is however justified by favourable outcomes and benefits to sustainability. Socio-cultural requirements for integrated management include community dialogue and public participation taking into account the opinions and concerns of all relevant parties, sectors and stakeholders such as indigenous people, local residents and land users. Ecological considerations include recognition of the connections among species, ecosystems and bioregions, for example the continuity between terrestrial and marine environments. Management should consider secondary impacts or flow-on effects, and be at the scale of whole bioregions, ecosystems or catchments, unrestricted by political boundaries. (See BIOREGIONALISM, TOTAL CATCHMENT MANAGEMENT, ADAPTIVE MANAGEMENT, STRATEGIC MANAGEMENT, PRECAUTIONARY PRINCIPLE) (MP)

**INTEGRITY :** 1. the quality of being ethical, virtuous, and consistent; 2. wholeness, completeness. (RW)

**INTELLECT:** In many philosophies, the soul is said to consist of the emotions, on one hand, and the intellect on the other. The intellect is responsible for pure, abstract, rational thought. Aristotle (q.v.) believed that the gods, and Maimonides (q.v.) believed that God and the angels (q.v.) are purely intellectual beings which love and look after us to the extent to which we exercise our intellects. Modern neurobiology is raising the question whether our intellectual activities are performed by a spiritual soul or can be explained in terms of the workings of a physical brain. (FL)

**INTELLECTUAL:** Pertaining to thought, or an intelligent thinking person. The intellectual often likes ideas and debate, and although may be a trained expert in a particular field, can spiral off into varied broad subjects. The responsibility of the public intellectual is to highlight injustice and show social leadership. (See EXPERT) (MP)

**INTELLECTUAL PROPERTY:** That area of the law involving patents, copyrights, trademarks, trade secrets, and plant variety protection (see INTELLECTUAL PROPERTY RIGHTS). (DM)

**INTELLECTUAL PROPERTY RIGHTS** the primary purpose for creating intellectual property rights is to provide an incentive for creating new inventions (see INTELLECTUAL PROPERTY). (DM)

**INTELLIGENCE:** Intelligence refers to the ability of the mind to handle and process information. Human intelligence is made up of a number of capacities, including logical deduction, reasoning, inference, analogy, abstract thought, perception, comprehension, memory,

creativity, learning from experience, application of knowledge, problem solving, recognition of importance and adaptability of response. In addition, there are multiple recognized types of intelligence, including verbal, logical, mathematical, spatial, kinesthetic, musical, interpersonal and emotional intelligences. This diversity illustrates the difficulties inherent in the measurement of intelligence. The intellectual environment of the young determines whether they are able to reach their genetic potential for brainpower. Of course humans are not the only intelligent agents on the planet, with various animal and artificial intelligences having different comparative strengths and functions. (See INTELLIGENCE QUOTIENT, EMOTIONAL INTELLIGENCE, ARTIFICIAL INTELLIGENCE) (MP)

**INTELLIGENCE QUOTIENT:** Controversial age-adjusted quantitative measure of intellectual performance. An IQ of around 100 is average. Much of the controversy has centred around the extent to which IQ is genetically determined (see EMOTIONAL INTELLIGENCE, GENETIC DETERMINISM).(MR)

**INTELLIGENT AGENT:** An autonomous software program or expert system which independently carries out its own specialized task or service. An intelligent agent may for example collect information of certain criteria from the internet, or learn to filter news or advertising according to user habits and preferences. (See EXPERT SYSTEM, ARTIFICIAL INTELLIGENCE) (MP)

**INTELLIGENT SYSTEM:** See ARTIFICIAL INTELLIGENCE, DECISION SUPPORT SYSTEMS, EXPERT SYSTEM.

**INTENSIVE CARE UNITS :** Hospital units providing continuous surveillance and care to critically ill patients. (DM)

**INTER- :** Combining prefix from Latin *inter* meaning ‘between’, ‘among’. (See INTRA-, META-, MULTI-, PRE-, POST-, TRANS-) (MP)

**INTERACTION :** Includes communication or inter personal contact between investigator and the subject between two or more persons. Private information includes information about behavior that occurs in a context I which an individual can reasonably expect that no observation or recording is taking place and information which has been provided for specific purposes by an individual and which the individual can reasonably expect will not be made public e.g. the patients" medical record. (JA)

**INTERCONNECTEDNESS:** See CONTINUUM.

**INTERDICTION:** 1. Law: A legal act or decree which commands, prohibits, forbids etc., culturally connected to Roman Law and interdiction as practiced by the Roman Catholic Church. 2. International Relations: Forceful disruption, isolation or interception, for example military interdiction of enemy movements or supply lines, or coast guard interdiction of planes or ships suspected of carrying contraband or illegal arms. (MP)

**INTERDISCIPLINARY:** (Inter- "between") An issue or approach which bridges between disciplines or across professions. Often new ideas or problems may be found in the less-explored regions between established areas of academic knowledge, and usually ethical and sustainable development issues require involvement of more than one profession. (See MULTIDISCIPLINARY, TRANSDISCIPLINARY, INTEGRATED MANAGEMENT) (MP)

**INTERFERING WITH NATURE:** A common objection to much modern BIOTECHNOLOGY (q.v.), especially GENETIC ENGINEERING (q.v.), is that it interferes with nature. This then raises the issue as to when interfering with nature is good and when it is not.

Few people argue that all instances of interfering with nature (e.g. the prevention of diseases through sanitation and vaccination) are bad, though what precisely is 'natural' is itself open to controversy. (MR)

**INTERFERON:** There are a number of types of these proteins in the body which are produced by cells as a reaction to infection by a virus. (DM)

**INTERGENERATIONAL EQUITY:** Equity between generations is one of the central defining principles of Sustainable Development. The ability of future generations to meet their needs should not be compromised by the actions of the present generation. (See INTRAGENERATIONAL EQUITY, SUSTAINABLE DEVELOPMENT) (MP)

**INTERLEUKINS:** Protein messengers between leukocytes in the body, some of which are also now made by genetic engineering for therapeutic use. (DM)

**INTERMEDIARY:** Someone who carries messages between people who are unwilling or unable to meet. (DM)

**INTERNAL MEDICINE :** The branch of medicine concerned with the diagnosis and treatment of diseases of the internal organ systems of adults. (DM)

**INTERNATIONAL BIOETHICS SURVEY:** A survey conducted by Darryl Macer and colleagues in 1993 in different countries about ordinary citizens' opinions and ideas when answering bioethics dilemmas. It introduced the field of descriptive bioethics. Results are in the book *Bioethics for the People by the People* (Eubios Ethics Institute, 1994). (DM)

**INTERNATIONAL CRIMINAL COURT:** With 120 nations voting for its Rome 1998 statute, the International Criminal Court (ICC) was open for business in 2002. Many of the indictments against Americans for actions during the Afghanistan and Iraq wars have been deflected by their non-recognition of the ICC. (See INTERNATIONAL HUMAN RIGHTS LAW, GENEVA CONVENTIONS, HAGUE TRIBUNAL, NUREMBERG TRIALS, JUST WAR THEORY, JUDGE ADVOCATE GENERAL, GENOCIDE, CRIMES AGAINST HUMANITY) (MP)

**INTERNATIONAL HUMAN RIGHTS LAW :** A synthesis of current potentially enforceable international human rights regulations. This synthesis aims at an acceptable system of 'universal' laws which find a non-culturally relative balance, for example between individualist and collectivist global value systems. The international element was added to law with the Nuremberg Charter after the horrors of World War II. Many of the philosophical values behind international human rights law are outlined in the Universal Declaration of Human Rights, adopted by the UN in 1948 accompanied by the Convention on the Prevention and Punishment of Genocide. Attempts at the regulation of war have tried to restrict justification for the resort to war, and failing that, to restrict the conduct of war. International war law found expression in the Geneva Conventions (1949) and Protocols (1977). Numerous UN Conventions and International Human Rights Treaties have since been widely signed, but have proven relatively toothless as international law without ratification into national laws and broad political subscription to specific treaties. The USA has had a poor record in this, requiring a two-thirds Senate majority for ratification. With international humanitarian law so difficult to enforce amongst the myriad treaties, national laws and truth commissions, a global legal system was required to deal with universal human values and horrifying war crimes. To this end the Hague War Crimes Tribunals (1993) and International Criminal Court (2002) have been established. Current and upcoming trials will also trial these institutions, and serve as some of the first strong legal disincentives for world leaders whose power creates war or suffering. (See INTERNATIONAL CRIMINAL COURT, UNIVERSAL

DECLARATION OF HUMAN RIGHTS, HAGUE TRIBUNAL, ETHNIC CLEANSING, HAGUE CONVENTIONS, GENEVA CONVENTIONS, LIEBER PROTOCOL, NUREMBERG TRIALS, CRIMES AGAINST HUMANITY) (MP)

**INTERNATIONAL MONETARY FUND (IMF):** Is a UN specialized agency, founded at the Bretton Woods Conference in 1944 to secure international monetary cooperation, to stabilize currency exchange rates, and to expand international liquidity - access to hard currencies. (DM)

**INTERNATIONAL SPACE STATION:** The International Space Station is the current and future operational version of previous space stations such as the Soviet *MIR* (1986-) and the first US space station *Skylab* (1973-79). An example of global cooperation and friendship, it serves as an example of the use of space for peace and international benefit. (See SPACE EXPLORATION) (MP)

**INTERNATIONAL TECHNOLOGY TRANSFER:** Movement of inventions and technical know-how across national borders.

**INTERNET:** What became the Internet was originally developed as ARPANET by the US Pentagon's Advanced Research Projects Agency (ARPA), discontinued in 1990 to give way to computers, hierarchically nested into an international telecommunications system of links. The material composition of the Internet is really only hardware for SOFTWARE, VIDEO CONFERENCING, VIRTUAL REALITY, CYBERSPACE, CYBERIA) (MP)

**INTERNET ADDICTION:** See GAMBLING ADDICTION.

**INTERNET AS A TOOL FOR CHANGE:** See INTERNET, TELEVISION AS A TOOL FOR CHANGE.

**INTERNET PRIVACY:** If your computer is connected to the internet, then the internet can, with a little know-how, also look inside your computer. Various intranets, firewalls, encryptions, virus detectors and other security software try to keep the back-door closed and your activities confidential. But the web is littered with personal data, and spy software can collect traces of internet information. The integration of mobile phones with internet functions has brought chat-room predators a step closer. New connectivity and processing power has also ignited citizen privacy issues in relation to government security, corporations and 'Big Brother'. (See HACKER, BIG BROTHER, CYBER CRIME, INTRANET, FIREWALL) (MP)

**INTERPROFESSIONAL RELATIONS :** The interaction of two or more professionals from the same or different fields. Related issues include medical etiquette, and the physician nurse relationship. (DM)

**INTERSPECIES FERTILIZATION:** Fertilization usually occurs within the same species, but it is sometimes possible for fertilization to occur between gametes of different species. Usually the embryos formed in that way will not develop. (DM)

**INTERVENTION :** Includes both physical procedures by which data are gathered (e.g Venipuncture) and manipulations of the subjects' environment that are performed for research purposes. (JA)

**INTRA- :** Combining prefix from Latin *intrā* meaning 'within' (sometimes used in opposition to either *inter* 'between' or *extra* 'outside of'). (See INTER-, META-, MULTI-, TRANS-) (MP)

**INTRACYTOPLASMIC SPERM INJECTION** see **I.C.S.I**

**INTRAGENERATIONAL EQUITY:** Equity among those within the current generation. The economic benefits and environmental impacts of development are often not distributed fairly between nations or within them. It has been noted that the central concept of Sustainable Development - a fair go for future generations - should hold equally for the current generation. Intragenerational equity is therefore a hypothetical goal of sustainability which addresses these injustices of resource distribution. (See **INTERGENERATIONAL EQUITY**, **SUSTAINABLE DEVELOPMENT**) (MP)

**INTRANET:** An internal web servicing an organization, similar in function to the Internet but not accessible from it. Corporate data, business plans, research agendas and meetings are conducted and stored within the confines of their intranet. Intranet architecture often allows internal users access to the Internet, but is protected from outside penetration by firewalls. (See **FIREWALL**, **INTERNET PRIVACY**, **TRANSPARENCY**) (MP)

**INTRAUTERINE DEVICE (IUD):** Contraceptive device inserted through the cervix into the uterine cavity. The origin of the IUD dates back to antiquity when Arabs used to prevent conception in their saddle camels on long journeys by introducing a round smooth stone into the uterus; the camel then repulsed the advances of the male as if she were pregnant. The first generation of modern IUDs, designed and produced in the late 1950s, were unmedicated devices produced following the development of the biologically inert plastic polyethylene. During the 1970s medicated or bioactive IUDs were developed which carried substances such as metallic ions (copper acting as a spermicide) or hormones. These medicated devices were developed to reduce the incidence of side effects and to increase their contraceptive effectiveness. (See **CONTRACEPTION**). (DM, IP)

**INTRAUTERINE GROWTH RETARDATION (IUGR):** is the most common term used to refer to the results of inadequate growth in the fetus. Another way is to describe the uterine growth-retarded infant as being small-for-gestational age, or small-for-dates which means a birth weight below the 10<sup>th</sup> percentile of intrauterine growth curves in general 2,500 g or less. In general, the lowest risk of neonatal death and the greatest likelihood of optimal physical and intellectual development is in children 3,000 g or more at birth; thus, normal intrauterine growth is considered a good marker for fetal wellbeing with the same being true for postnatal growth. A large body of information exists about factors associated with low birthweight, and the population most likely to be "at risk" many of the determinants relate to the helplessness engendered by vicious poverty cycles and include elements of physical and psychological stress. (See **ADDICTION**, **PREMATURITY**, **SUDDEN INFANT DEATH SYNDROME**). (IP)

**INTRINSIC** belonging inherently to some thing by the very nature of its existence. Biodiversity is becoming an intrinsic component of the ethical debate; thus the ability for humankind to value the innate may prove to be one of the very keys to long-term survival. (IP)

**INTRINSIC VALUE OF NATURE:** Placing value and importance on ecosystems and physical environments which is completely independent of human experience. At the farthest end of the deep ecology spectrum, nature is considered priceless. For example, biodiversity has survival merit independently of whether or not it has cultural relevance or contains components useful to humans. (See **INSTRUMENTAL VALUE OF NATURE**, **ENVIRONMENTAL VALUATION**, **BEQUEST VALUE**) (MP)

**INTRODUCED SPECIES:** An exotic species which has arrived, often thrived, in a foreign environment. Introduced species may successfully compete with native species by invading habitat and ecological niches. Examples which resulted in damage to Australian ecosystems include the rabbit, fox, cat, cane toad, fire ant, lantana, bitou bush, water hyacinth, camphor laurel, many garden plants, plantation pines and for that matter most crops. It is a costly path once an introduced species has arrived, and for that reason Australia has a good quarantine system. Biological control has been semi-successfully used, for example myxomatosis and calicivirus against rabbits. With biological control care to avoid suffering (sterility control is better), and undue interactions with other parts of the ecosystem (the cane toad was originally envisioned a biological control!) Introduced species may not necessarily be pest species, depending on their amenity or impact. Debate continues over the divide between animal rights advocates and environmentalists on the issue of introduced species. (See PEST SPECIES, BIOLOGICAL CONTROL, CANE TOAD). (MP)

**INTRONS:** The DNA sequences interrupting the protein-coding sequences of a gene that are transcribed into mRNA but are cut out of the message before it is translated into protein. Compare *exons* . (DM)

**INVASION DAY:** A revealing colloquial term for public celebrations such as Australia Day (January 26) which commemorates first European arrival in 1788, Columbus Day (October 12) commemorating European arrival in America in 1492, Indonesian Invasion Day in East Timor (December 7) or similar anniversaries in other countries. The term is used by those in sympathy with the Australian Aboriginals, Amerindians and other indigenous peoples, for whom the beginnings of the destruction of their way of life is no reason to celebrate. (MP)

**INVENTION:** An original device, contraption, or process developed after study and experiment. Genetically engineered animals, plants, and micro-organisms have been recognized as patentable forms of biological invention in the United States, but this is not always the case in other countries, especially where animals are concerned. (DM)

**INVERTEBRATE :** An animal lacking a backbone. (RW)

**INVESTIGATIONAL DRUGS :** Drugs which have received US FDA approval for human testing but have yet to be approved for commercial marketing. These include drugs used for treatment while they still are undergoing clinical trials. (DM)

**INVESTIGATORS :** A US term for professionals engaged in biomedical or behavioral research.

**INVOLUNTARY COMMITMENT:** Civil commitment to an institution such as a hospital for the mentally sick. (DM)

**INVOLUNTARY EUTHANASIA :** The killing of a patient who is suffering or is afflicted with an incurable disease or condition, for reasons of mercy, without that person's consent (See EUTHANASIA) (DM)

**INVOLUNTARY STERILIZATION :** Sterilization performed without the consent of the patient. (DM)

**IONOSPHERE** refers to the region of the upper atmosphere generally above 50 km up which is in a state of significant ionization (see BIOSPHERE & OZONE HOLE). (IP)

**IPCC :** Intergovernmental Panel on Climate Change.

**IQ:** See INTELLIGENCE QUOTIENT.

**IRB:** See INSTITUTIONAL REVIEW BOARD.

**IRRIGATION :** The supply of water to argricultural fields and paddies. (RW)

**ISEP :** International Society for Environmental Protection.

**ISLAM:** (from the Arabic root s.l.m., meaning "submission to the will of God"). Initially, this term was applied in a generic sense to those who submitted to the will of God. Thus, Abraham and various other Biblical characters are referred to in the Quran (see Quran) as professing Islam. Later, the term became more specified, referring to those who accepted the Quran and the prophecy of Mohammed in addition to the basic submission to the will of God. The most sacred text of Islam is the Quran. The Hadith (see Hadith) collections also contain important traditions and customs of Islam. The religious duties of Islam include: prayer, giving of charity, pilgrimage to the city of Mecca in Saudi Arabia. (AG)

**ISLAMIC BIOETHICS:** A religious framework based on Islamic jurisprudence, dealing with ethical issues associated with biosciences ( see bioscience)such as beginning and end of life, reproduction, genetics, organ transplantation, environment, newly emerged problem resulted from new scientific and technological procedures and discoveries. According to Islamic bioethics making decision has to be based on cooperation of the specialists on the field and Islamic jurists, Faqih (see FAQIH). (AB)

**ISLAMIC MEDICINE :** It can be defined as a body of knowledge of medicine that was inherited by the Muslims physicians. It begun with the translation of Unani (see Unani) medicine from Greek in to Arabic, mostly from Hippocrates (460-377BC)and Galen 8 131-210 AD). At that time Arabic was the religious and scientific language in the Islamic countries. In the history of Islamic medicine that age (8th -9th centuries), is called "Translators age", simultaneously the "golden age" of Islamic medicine emerged which was developed to the extend that replaced the Unani medicine.

The Muslim physicians had studied Unani medicine in enriching it by giving their own remarks based on their experiences and views as well as taking in to consideration health recommendation expressed by in Islamic sources such as Quran and Hadith. Medical practice in the Islamic civilization had never been as a mere profession ,but was connected to theology, philosophy and ethics. Among those who made valuable contributions, Al-Razi(625 AD) and Ibn Sina (1037 AD) are the most prominent for establishing Islamic medicine foundation. (AB)

**ISOLATED STORAGE** Storage of a hazardous chemical substance , other than storage associated with an industrial installation on the same industrial complex. (JA)

**ISOTOPE:** An isotope is one of the different varieties of a particular chemical element. Isotopes differ from one another by the number of neutrons in the nucleus, and have differing physical properties. Some but not all isotopes of an element may have an unstable nucleus and be prone to radioactivity. (See ATOM, ELEMENT, HYDROGEN) (MP)

**IT :** See INFORMATION TECHNOLOGY.

**ITERATIVE PROCESS:** A method by which progress is in a stepwise fashion with new depth and detail of information added and incorporated at each stage. (See HEURISTICS) (MP)

**IUBS:** International Union of Biological Sciences.

**IUCN:** The World Conservation Union (a.k.a. International Union for the Conservation of Nature & Natural Resources)



**IUD** : see INTRAUTERINE DEVICE

**IUGR** : see INTRAUTERINE GROWTH RETARDATION

**IVF**: See *in vitro* fertilization.

## J

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<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**JAIL FEVER** : A disease that raged in English prisons from the 16<sup>th</sup> to the 18<sup>th</sup> centuries and was caught by many working at the Old Bailey. The disease has now been recognized as a severe form of typhoid fever, which ran rampant in the then existing unhygienic jail conditions. (IP)

**JAINISM**: The teachings of Mahavira (see Mahavira). According to these teachings, the right conduct is achieved by practice of: ahimsa (see ahimsa), speaking the truth, refraining from theft, chastity, and non-attachment to worldly things. Jainism also teaches vegetarianism, discouraging even the consumption of potatoes and onions, because these are held to contain a multitude of living beings within them. Two branches of Jainism are Digambara ("sky clad") and Svetambara ("white clad"). As the names indicate, the Digambara had the custom of going about naked, as an extreme expression of detachment from material things. The Svetambara, on the other hand, traditionally wear simple white cloth. (AG)

**JAKOBOVITS, LORD RABBI IMMANUEL**: In 1955 the doctoral thesis of this then young rabbi created the term "Jewish medical ethics", which became the title of the first, and now classic, text on the subject, published in 1959. The comprehensive treatise traced the development of the Jewish views from antiquity to the date of publication, calling upon a variety of religious, historical, medical, legal and philosophic sources. Rabbi Jakobovits continued his scholarly contributions to the field of modern bioethics, then in its infancy. In addition to his academic publications he gave many public lectures throughout the world. He organized seminars for physicians and other health professionals and was a stimulus for the growth and development of interest in the field of Jewish medical ethics. Many of the leading scholars in the field were inspired by his leadership and considered him their guide and mentor. His subsequent roles as rabbinic leader in the United States and Great Britain prevented his active role as a researcher and active scholar in the field. But he became perhaps the most respected and articulate spokesman for the Jewish position on ethical issues in biomedical ethics. He was knighted in 1981 and appointed to the British House of Lords in 1988, where he spoke frequently on controversial ethical issues. In 1991 Rabbi Jakobovits was the first recipient of the Templeton Foundation Award for Progress in Religion. He was responsible as well for the creation of a Center for Jewish Medical Ethics at the Ben-

Gurion University in Beer Sheva Israel in 1983. He died in 1999, active to very last days of his life.(SG)

**JAMES, W.:** (1842-1910) An American philosopher, psychologist and religious theorist, his most famous works were *The Varieties of Religious Experience* and *Pragmatism: a New Name for some Old Ways of Thinking*. In the latter work, he proposed the "pragmatic theory of truth" according to which a statement's truth or falsity is not determined by whether it reports real facts in the world, but rather by whether on not it "works". If believing a statement can help us improve human life, for example, then it is as true as anything need be. Similarities to Utilitarianism (qv) are obvious.

James' greatest opponent was Bertrand Russell (qv), who argued that (1) truth cannot be defined as what works because some beliefs can work very well while not being true; and (2) The statement "This statement works" can be true only if it reports a real fact in the world, ie the fact that the statement works. So truth is something deeper than working.

Although James was a serious philosopher, his slogan, "Truth is the cash value of a proposition" unfortunately lead people to think of him unfairly as just an American who primarily liked money.

Today's "evidence based medicine" contains some hints of influence from James' pragmatism because what interests us is not so much the microbiology behind a treatment but the "outcome", ie whether or not it works.(FL)

**JEHOVAH'S WITNESSES :** A religious society founded and led by Charles Taze ('Pastor') Russell in the 1870s. They are distinguished mainly by the belief that the Kingdom of God began in 1914 and will replace all human governments. Every Witness preaches this from 'house-to-house'. There are several million active Witnesses worldwide. (IP)

**JENNER, EDWARD :** (1749-1823). British physician and originator of vaccination. As a child he became familiar with the popular insight that those individuals who contracted the less virulent cowpox became immune to the deadly smallpox. In 1778 he began collecting material to confirm his conviction concerning cowpox as a protective virus. He performed a number of experiments on human subjects where he transferred lymph taken from cowpox lesions and inoculated healthy individual. These experiments established that those few vaccinated individuals who did subsequently contract smallpox suffered only from mild attacks while the majority were completely immune. The findings were published in the celebrated *'Inquiry into the causes and effects of the variolae vaccinae'* in 1798. All modern methods of preventing certain infectious diseases by immunological methods trace their ancestry to Jenner's work. (See IMMUNE SYSTEM, AUTOIMMUNE DISEASE, DEPRESSED IMMUNE RESPONSE, PASTEUR, LOUIS). (IP)

**JESUS, CHRIST: (c. 61 BC -c. AD 30)** Also called *Jesus of Galilee* or *Jesus of Nazareth*, he is the founder of Christianity, one of the world's largest religions, and the incarnation of God according to most **Christ** ians. His teachings and deeds are recorded in the New Testament. The basic outlines of his career and message, however, can be characterized when considered in the context of 1st-century Judaism. (DM)

**JETSAM :** Jettisoned cargo and goods, thrown overboard from tall ships to lighten the load during storms. (See FLOTSAM) (MP)

**JEWISH BIOETHICS:** "Jewish bioethics" can be defined as "bioethics originating in ancient Jewish texts", or "bioethics as taught by orthodox rabbis", or as "bioethics as taught by rabbis of all kinds" or as "bioethics as taught by Jews". All of these definitions are correct, because the only people who can claim to represent Judaism with more authority than others are proven and accepted prophets. And although there may be prophets today, none are proven and accepted.

Jewish bioethics is often thought of as bioethical decisions based on ancient, holy books like the Bible, the Mishna, the Talmud and great rabbis like Maimonides (qv), Rabbenu Asher, Rabbi Yosef Karo, etc. The problem, however, is that experts who know these, and all other

standard Jewish religious sources thoroughly, can come to totally different opinions on important bioethical issues. Since they all know the sources, it is clear that the sources are not what decide the issue. For example, the Chief Rabbinate of Israel accepts brain death; but many rabbis will not regard a patient as dead before the heart stops beating. Again, although many orthodox Jews are very strict about abortion, allowing it only when the mother's life is in certain danger, Rabbi Eliezer Waldenberg, who was a rabbinical judge in Jerusalem and who may be regarded as "ultra-orthodox" is quite liberal about abortion and allows it in cases of rape, severe fetal anomalies, adultery, etc. Again, although perhaps the majority of rabbis forbid disconnecting a ventilator and thereby allowing a patient to die, the late Rabbi Haim David Ha-Levi, who was Chief Rabbi of Tel Aviv - Yaffo, allowed it, saying that one is not killing the patient but simply "removing an obstacle to the peaceful departure of the soul from the body." All these examples show that there is no unique "Jewish Bioethics", but a variety of opinions. Indeed, ancient holy sources have nothing to say about many of today's bioethical questions, like cloning, genetic screening, GMO's etc. Religious Jewish bioethicists are, therefore, increasingly basing their opinions on scientific and clinical evidence, together with human reasoning in response to the international bioethical debate, and the idea of a uniquely "Jewish" bioethics may be disappearing.(FL)

**JIHAD:** From Arabic root j.h.d literally means effort. Any effort on the way of the faith. It is also included sacrificing one's asserts or life. The most important Jihad in Islam is fighting against one's own wrongful moral and behaviors for self-purification. (AB)

**JOY:** (Old French *joie* , from Latin *gaudium* ) Joy is the feeling and expression of pleasure or delight resulting from a combination of happy circumstances and openness to exuberant moods. Perhaps unlike some other varieties of pleasure, there is little ethical danger in an over-indulgence in joy, evidenced for example by descriptions of increasingly joyous contemplation of God for those reaching a more enlightened state in Christian and Eastern spiritual practices. (See HAPPINESS, PLEASURE) (MP)

**JP:** Justice of the Peace.

**JUDICIAL ACTION :** Used for discussions of the role of the judiciary in bioethical decision making. (DM)

**JUDEO-CHRISTIAN:** Although it is common to refer to the "Judeo-Christian tradition", it is not clear that Judaism and Christianity have anything in common which is not shared by all religions. While the divinity of Jesus of Natzrat is essential to Christianity, Jews all over the world are united in denying that Jesus was more than a human being.

Christianity is a religion, open to everyone, who need only believe in certain essential principles and, perhaps, undergo a ceremony of baptism, in order to be accepted. Judaism, on the other hand, is not a religion but a people (many of whom may be atheists or agnostics), with a widely -- although not universally -- shared loyalty to one another, to the Land of Israel, and to certain holy places, like the Temple Mount in Jerusalem and the Cave of the Fathers and Mothers in Hebron.

Both Judaism and Christianity accept the Old Testament of the Bible, but only the Christians accept the New Testament. The Christian acceptance of the Old Testament, moreover, is highly conditional. Christians believe that although God at first chose the Jews as the Chosen People, when the Jews failed to fulfil certain conditions, God revoked this choice and substituted the Chosen People with a fellowship of all those who believe in Jesus. At the same time, most sects of Christians believe that God cancelled many commandments in the Old Testament, including the requirement of neonatal male circumcision, the prohibition of eating pork and certain other foods, the prohibition of work on Shabat (Saturday) etc.

Only certain sects of Christians believe that the Jews are still the Chosen People, and that Jesus will not return until the Jews all return to the Land of Israel. Both Judaism and Christianity teach virtues like simplicity, loving one's neighbor, unselfishness, etc. But these are not unique to a "Judeo-Christian Tradition" because they are also taught in BUDDHISM, HINDUISM, etc. (FL)

**JUDGE ADVOCATE GENERAL:** Legally trained officers who have the power to adjudicate the strategic targeting of bombs and other war tactics with reference to the international laws of war such as the Geneva Conventions. Modern surveillance technology and the precision of smart bombs have allowed intimate knowledge of the consequences of strategic actions. Legal approval before the employment of weapons has become a powerful tool to protect generals from legal repercussions and to prevent atrocities such as collateral damages. (See COLLATERAL DAMAGE) (MP)

**JUNKIE :** A drug addict, especially one who regularly self-injects heroin (a slang term for heroin or other narcotics being "junk"). The junkie's daily life is dominated by efforts to feed their dependency the pursuit of money, organizing of suppliers, dealing and administering of the high. The heroin junkie lifestyle - the criminal element, unsavory associates, non-sterile street conditions, impure or unknown as great a risk as the drug itself, and is reinforced by criminalization and intolerance. (See ADDICTION, HEROIN, HEROIN INJECTING ROOMS) (IP+MP)

**JUS AD BELLUM:** (Latin: "Justice in going to war"). Refers to conditions for the justification of the resort to war. These include just cause, right intention and last resort. See JUST WAR THEORY, *JUS IN BELLO* . (MP)

**JUS IN BELLO:** (Latin: "Justice in warfare"). Refers to justice and justifiability in the conduct of war and how warfare may permissibly be conducted. The Geneva and Hague Conventions were concerned with such conditions of war conduct rather than justifying the initial resort to war. See JUST WAR THEORY, *JUS AD BELLUM* . (MP)

**JUST WAR THEORY:** Just war theory attempts to identify the conditions and actions which justify the use of war, on the assumption that wars are an inevitable consequence of a multi-state international system. A supposedly "Just War" (*jus ad bellum*) must be characterized by the following conditions: a) just cause, such as the protection of human rights, b) right intention, which should be the establishment of peace, c) appropriate proportionality, with just ends outweighing the means, d) the defensive rather than offensive position, e) use of force only as a last resort after diplomacy and economic measures, f) competent authority and leadership, g) a high probability of success, h) limitations on the use of excessive force, i) non-use of conscripted or child soldiers, j) non-use of internationally maligned tactics or weapons, for example adherence to all the Geneva Conventions, and k) the use of careful discrimination for the prevention of innocent casualties. (See INSTITUTION OF WAR, PEACE ENFORCEMENT). (MP)

**JUSTICE** 1. fair, just conduct, self-authority in maintenance of equity, in bioethics = love of others 2. judicial proceedings, brought to justice, court of justice, magistrate, judge treating fairly personified in art as a goddess holding balanced scales or a sword with sometimes veiled eyes portraying impartiality. In 11<sup>th</sup> Century, the name *Justitia* was applied in a general way to persons charged with the administration of the law 3. theological quality of being morally righteous, serving the divine law and exhibition of this principle in action in the sense of "one of the four cardinal virtues" (IP+DM)

A basic ethical principle in bioethics, fairness in distribution or what is deserved and what is due to a person. (JA)

# K

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**KABBALA:** Kabbala is Jewish mysticism, believed to have been passed on in secrecy, from generation to generation, since Biblical times. The major sources are Sefer Yetzira (Book of Creation), which Avraham is believed to have written, and Zohar (Splendour), believed to contain wisdom dating from Biblical times, which was later compiled by Rabbi Shimon bar Yochai, who lived when the Romans ruled the land of Israel. Other important sources are the teachings of the 16th century Israeli Rabbi Itzhak Luria ("The Holy Ari"), which were compiled by his student, Rabbi Haim Vital. The complexities of the Hebrew language make many English works and translations unreliable, but the scholarly writings of Gershom Scholem are an exception and can be read with profit, as can many writings of Rabbi Arie Kaplan. An important Kabbalistic doctrine is that this material world is the lowest of several worlds created by God. The meaning of life is the effects which our actions in this world have on the worlds above, either repairing and perfecting or damaging and contorting. Another important doctrine is reincarnation. As in Hinduism, souls enter bodies in order to repair various defects or to learn various lessons. If we do not learn various lessons in one life, we may expect to be sent back, perhaps millions of times, until we correct the requisite defects. Of course these doctrines are not scientifically provable, and even some great rabbis (notably, the great medieval Rabbi Saadia Gaon) did not accept reincarnation. But we cannot disprove these things scientifically either. And the existence of speculation about the mystical might lead us to accepting humbly that we do not know the meaning of life. Even with respect to a terribly suffering terminal patient, we cannot say with scientific certainty whether or not this suffering is to learn certain lessons which will have to be learned sooner or later anyway. Nor can we say with any scientific certainty whether what awaits this patient after death is better or worse than what the patient is enduring at this moment. (FL)

**KAMA SUTRA OF VATSYAYANA:** (Sanskrit: "Aphorisms on Love"). Indian classic on the art of love conduct and lovemaking. First composed by Vatsyayana at an unknown date between the 1st and 4th Centuries. This often controversial treatise describes a variety of intercourse positions and has sections concerning the wives of other people and courtesans. An English version was secretly published by Sir Richard Burton in 1883, and a scholarly illustrated version was translated by S.C. Upadhyaya in 1961. (See KAMA) (MP)

**KANT, IMMANUEL:** (1724-1804) Prussian philosopher. His most famous works are the Critique of Pure Reason and the Fundamental Principles of the Metaphysics of Morals. In the former work, he studied the conditions under which we can achieve absolute certitude in such fields as mathematics, logic and science. He claimed that certitude is a consequence of a pre-determined logical and sensual framework in the mind, which determines how the world appears to us. We cannot know things "as they are in themselves", but only things as they appear to us.

We can achieve certitude about things as they appear because they must appear in conformity with the pre-determined structures in our minds. In restricting knowledge to the world of appearance, Kant also achieved his religious goal of "restricting reason in order to leave room for faith". Reason has to do with appearances. But faith, according to Kant, has to do with three major issues: God, Freedom, and the Afterlife. And these issues belong not to appearances but to the world as it is in itself.

The Fundamental Principles of the Metaphysics of Morals is Kant's major statement of his ethics. Kant's ethics is called "deontological" ie having to do with duty rather than mere utility. But JS Mill in his book on Utilitarianism claimed that if you study carefully Kant's examples of ethical acts, you will see that he is really a utilitarian.

Kant's is famous for his "Categorical Imperative", which he formulated in several different ways. One formulation says that an ethical act is one which is based on a principle which can be a law of action for all rational creatures. The idea is that one should not make exceptions for oneself, but should act as everyone should act in similar circumstances. Philosophers have derived from Kant the idea that ethical principles should be "universalizable", ie they should apply to everyone. This is hard to reconcile with today's ideas of cultural relativity in ethics. Another formulation of the Categorical Imperative says that we should treat all rational creatures as ends in themselves and not as means to our ends. This is considered to be the most beautiful and sublime of Kant's principles. He dreamed of a Kingdom of Ends, a society in which no one would exploit anybody else and use them as means to one's own ends, but everybody would treat everybody else with high respect, as ends in themselves. This sounds very beautiful until one reflects that it is extremely hard to find any text where Kant says that all other "human beings" should be treated as ends in themselves. What one finds that all other "rational creatures" should be treated as ends in themselves. And when one asks what is a "rational creature" one can only turn to the idea of rationality as developed in the Critique of Pure Reason, ie the ability to reason logically, mathematically and scientifically. So Kant's much-celebrated Kingdom of Ends is really a very exclusive beautiful society of beautiful people who fit Kant's idea of rationality. It has no room for those who are not "rational". This leads us to ask how Kant would want to treat human beings who do not fit his idea of rationality, ie severely deformed neonates, he mentally ill, the demented, and perhaps especially, people from other races and cultures whose standards of rationality are not the same as Kant's. (FL)

**KAROSHI:** A Japanese term referring to death through overwork, most commonly from heart attack. Working yourself to death may either be the result of self-induced workaholicism or the relentless drive of corporate pressure. Americans and Japanese are the two most overworked peoples, but only for the latter has karoshi been a legally recognized cause of premature death. (See WORKAHOLIC, WORKAHOLISM) (MP)

**KARYOTYPE:** A photomicrograph of an individual's chromosomes arranged in a standard format showing the number, size and shape of each chromosome; used in low-resolution physical mapping to correlate gross chromosomal abnormalities with the characteristics of specific diseases. 1. Indicates chromosome composition of an organism 2. Photomicrograph showing chromosome composition. (DM, JA)

**KARYOTYPE ANALYSIS :** Chromosome analysis performed on dividing cells (usually cultured lymphocytes) of an individual. Chromosomes can be stained with different chemicals, thus resulting in different banding patterns. The chromosomes are classified according to the size and bands in pairs of autosomes (22 pairs) and sexual chromosomes (1 pair), thus enabling to detect abnormalities associated to a clinical phenotype. The most common are trisomies (trisomy 21 is known as DOWN SYNDROME), the XO sex chromosome monosomy or Turner syndrome, and partial translocations or inversions. (GK)

**KASHRUT:** The status of being kosher, i.e. permissible for consumption according to Jewish tradition. Important factors involved in kashrut status of foods include: avoidance of numerous animal species and their products, avoidance of meat from an animal which was not slaughtered and prepared according to Jewish tradition, avoidance of mixing milk products with meat products, or even eating the two at the same meal. Maintaining kashrut status of foods requires the keeping of separate sets of dishes/utensils for milk products and for meat products. In addition to the regular standards of kashrut which are applicable to the entire year, there are further restrictions which apply during the week of Passover, when leavened bread and related products are also avoided. (AG)

**KELVIN SCALE:** See TEMPERATURE.

**Ketamine Hydrochloride :** A non-barbiturate substance originally used intravenously or intramuscularly to produce anesthesia where the patient may appear to be awake but is unaware of the environment and unresponsive to pain. It is still popularly used in veterinary medicine. Ketamine - or "special-K" - became prevalent in the club scene in the 1990s as an ecstasy additive or alternative. Its tranquillizing effects have earned it the media tag of "*date-rape drug*" (much like alcohol). When snorted it relieves pain, produces distortion of time and perception, hallucinations, loss of motor control, and in overdose respiratory depression, coma or death. (See ECSTASY, PCP). (IP+MP)

**KEW GARDENS:** Royal Botanic Gardens at Kew. UK., houses a large number of plant varieties with extensive and smoothly manicured lawns, serves as a picnic spot with Palm House and Chinese Pagoda. (JA)

**KEYSTONE SPECIES:** An important species which plays a key role in holding the ecosystem together, the absence of which would have catastrophic consequences for community composition and ecological structure across the food web. Conservation of these organisms is the key to the survival of many others irrevocably linked by natural systems and processes. Keystone species are often the dominant habitat vegetation, but may be harder to predict ranging from the charismatic sea otter to otherwise inconspicuous soil or plankton organisms. (See INDICATOR SPECIES) (MP)

**KIDNEY DIALYSIS:** Also called Hemodialysis, Renal Dialysis, or Dialysis, in medicine, the process of removing blood from a patient whose kidney functioning is faulty, purifying that blood by dialysis, and returning it to the patient's bloodstream. The artificial kidney is a machine that provides a means for removing certain undesirable substances from the blood or of adding needed components to it. By these processes the apparatus can control the acid–base balance of the blood and its content of water and dissolved materials. Another known function of the natural kidney—secretion of hormones that influence the blood pressure—cannot be duplicated. Modern dialyzers rely on two physical questions of how to allocate persons to the limited number of dialysis machines. (DM)

**KILO-** : A prefix denoting  $10^3$  thus in units of length 1 kilometer (km) =  $10^3$  meters (m) and in units of mass 1 kilogram (kg) =  $10^3$  grams (g). (See METRIC UNITS). (IP)

**KINGDOM:** 1. Politics: A territory, country or community reigned over by a king or queen. Sovereign rule may be actual and supreme, or only nominally behind the scenes of a democratic government. Ethical concerns have been raised about authoritarian kingdoms whose rule is obtained by bloodline rather than by other independent means of approval. 2. Biology: The highest level of taxonomic classification of organisms, commonly divided into the Animalia, Plantae, Fungi, Protista and Monera. (See PHYLUM, SPECIES, TAXONOMY) (MP)

**KITAB-E-AKDAS :** (in Arabic/Persian literally "Most Holy Book") The most sacred book of the Baha'i. This book provides the laws and regulations for Baha'is. (AG)

**KINDNESS :** See BENEFICENCE.



**KING, MARTIN LUTHER, JR. : (1929-1968, USA)** a Baptist minister and social activist who led the civil rights movement in the United States from the mid-1950s until his death by assassination in 1968. His leadership was fundamental to that movement's success in ending the legal segregation of black Americans in the South and other parts of the United States. King rose to national prominence through promoting nonviolent tactics with lessons from Matma Gandhi, in famous events like the March on Washington (1963) to achieve civil rights. He was awarded the Nobel Prize for Peace in 1964. He was assassinated in 1968. (DM)

**KNOWLEDGE:** Knowledge is true belief with justification. This opens up questions on the nature of truth, the conditions for belief, the criteria of justification and the organization of information. Epistemology is the philosophical 'theory of knowledge' investigating its fs are sorted into 'domains' of kno(e.g. Hdue to wledge investigating the 'knowledge gaps' between estabON, INTELLIGENCE, EXPERT) (MP)

**KNOWLEDGE ACQUISITION:** Knowledge is acquired through sensations, reason, introspection or memory. Data, information, statistics, processes, causal theory, hypotheses and heuristic rules combine to produce knowledge stored as fuzzy sets in language, memories and conceptual models. Knowledge and beliefs are arranged along a scale from doubt to certainty; one's knowledge has passed the truth condition, one's faith passed the belief condition. This occurphilosophy and scientific research. (See KNOWLEDGE, BEST AVAILABLE INFORMATION, DATA MINING, IDEAS PRODUCTION, MEMETICS, FUZZY LOGIC, COMPLEXITY THEORY, INFORMATION, EDUCATION) (MP)

**KNOWLEDGE ENGINEERING:** The branch of engineering which integrates knowledge from a domain expert into computer systems to create information technology, expert systems and artificial intelligence. (See EXPERT SYSTEM) (MP)

**KNOWLEDGE MANAGEMENT:** The management of professional expertise and experience in an organization. Top management is in charge of strategic decision-making, middle management handles tactical decisions, and employees make workplace decisions, but with both upwards and downwards flow of ideas and knowledge. (See SUSTAINABLE CORPORATION) (MP)

**KNOWLEDGE VALIDATION:** The testing of knowledge to determine its accuracy and precision. In science, knowledge validation is performed using experiments to test the veracity of hypotheses. In technology, modeling tools such as expert systems must undergo sensitivity analysis to test the robustness of any knowledge the system may produce. (See SENSITIVITY ANALYSIS) (MP)

**KORAN:** see QURAN.

**KOSHER :** See KASHRUT.

**K'UNG FU-TZU:** See CONFUCIUS.

**KURTOSIS:** A measure of the degree of peak in a frequency distribution. A sharp peak is leptokurtic, moderate is mesokurtic and a platykurtic distribution is relatively flat. (See MEASURES OF DISPERSION, SKEW, NORMAL DISTRIBUTION) (MP)

## L



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**LABELING:** See STIGMATISATION .

**LAMARCKISM:** Theory of evolution in which organisms produce offspring with adaptive characteristics as a direct result of their own environments. So, for example, a person of average musical ability as a child who then became a professional musician would be expected to have children of above average musical ability. Classic experiments in the early twentieth century dealt a blow to Lamarckianism. In these experiments mice had their tails cut off for generation after generation. Yet, contrary to what Lamarckianism would predict, each generation of mice was still born with normal tails. Some biologists think that Lamarckianism may still be important in certain circumstances but Darwin's alternative theory of natural selection is almost universally held to be correct. (See DARWIN) (MR)

**LA NINA-SOUTHERN OSCILLATION PHENOMENON** refers to the warm ocean current that blows along the northern tropical coast of South America in its stabilizing phase. *La Nina* refers to "the child" of constancy as opposed to *El Nino* "the Child" of change (see SOUTHERN OSCILLATION INDEX & *EL NINO* -SOUTHERN OSCILLATION PHENOMENON). (IP)

**LAND DEGRADATION:** The decline in integrity, fertility and usefulness of the land, usually as a result of human mismanagement. This reduction in land quality has impacts on both human utility such as farm productivity, and ecosystem utility such as the ability to maintain biodiversity. Common forms of land degradation include water and wind erosion, salinization from over-irrigation or land clearing, soil acidification from overuse of fertilizers, habitat and vegetation destruction, chemical contamination and pollution, landslips and other soil loss or movement, decline in soil structure from stock trampling, soil compaction from heavy equipment, and loss of soil fertility due to excessive agriculture. (MP)

**LAND MINES:** Land mines are anti-personnel bombs laid covertly across the landscape to wait for a passer-by to trigger their deadly explosive charge. They stand out from other weapons by being non-discriminatory – equally devastating to a civilian as a combatant, and long-lasting – usually long beyond any cease in hostilities. Land mines are a major Somalia, but have been typically manufactured by rich countries such as the US, UK, Russia, France and China. Recent air-released mines have euphemistically been termed ‘cluster bombs’. Eminent personalities have crusaded against land mines, including Tibet’s Dalai Lama and Britain’s late Princess Diana. A of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction. (See EXPLOSIVES, CONVENTIONAL WEAPONS, DISARMAMENT, NON LETHAL WEAPONRY) (MP)

**LAND RIGHTS :** See NATIVE TITLE LEGISLATION - AUSTRALIA.

**LANDSAT:** Any of a series of land-observing satellites useful for civilian land-use mapping, resource assessment, and measuring habitat destruction and other environmental data. The first satellite was launched from the US in 1972 under the Earth Resources Technology Satellite project, a program renamed 'Landsat' in 1975. A 'Seasat' satellite for monitoring of the oceans has also been in existence. Landsat has operated with a non-discriminatory 'open skies' policy, despite broad similarities with spy satellites which have applications to military intelligence. (See REMOTE SENSING, LAND USE, SPY SATELLITES) (MP)

**LAN ONG :** (1720-1791) Vietnamese physician. His major work is "Hai Thuong y tong tam linh" (Treatise on Medical Knowledge Accumulated by Hai Thuong). This work contains an encyclopedic range of medical information, based both on Chinese and Vietnamese sources. Lan Ong's work also includes descriptions of 722 plant species and their medicinal applications. (AG)

**LAO-TSE:** (Lao-zi in pinyin spelling) Author of the text *Daodejing* (Tao Te Ching). The text itself is from the 3rd cent., but the teachings contained in it are more ancient. In this book, Lao-Tse focuses on concepts of non-action, and nothingness in an attempt to understand the complexity of the universe. (See **TAO TE CHING** ). (AG)

**LAPAROSCOPY:** Direct visualization of the ovaries and the exterior of the fallopian tubes and uterus by means of a laparoscope (a long, narrow, illuminated instrument) introduced through a small surgical incision below the navel, to evaluate any abnormalities. Surgical procedures may also be performed using this method. (IP)

**LASER TECHNOLOGY:** (Abbreviation of 'Light Amplification by Stimulated Emission of Radiation') The production of monochromatic high-intensity beams **WEAPONS**) (MP)

**LASER WEAPONS:** The laser weapon has long been a staple of science fiction spacecraft, but fortunately has had limited attention in real-world military deployment. Nevertheless, blinding lasers have been commercially available, and can blind temporarily or permanently depending on how they are used and whether the victim is wearing vision enhancement equipment. Blinding lasers have been discussed in the ethical context of non-lethal weaponry, however the horror of deliberately causing blindness is debatably at similar depths of inhumanity as killing humans outright with bombs. An 'X-Ray Laser' has been targets. (See **NON-LETHAL WEAPONRY**, **SPACE WEAPONS**, **MISSILE DEFENSE**) (MP)

**LATE ONSET DISORDERS :** Disorders that normally become symptomatic in adult life. (JA)

**LATERAL THINKING:** Producing ideas by thinking 'outside the box', or along an alternate tangent of thought to the traditional 'high probability' train of 'vertical' literal thinking. A term developed by Edward de Bono, lateral thinking can be induced by looking at a problem from many points of view, reversing components of an idea, 'working backwards' from an option/rational reasoning. (See **PO**, **BRAINSTORMING**, **REASONING**) (MP)

**LAW:** The science or philosophy of law; or, a legal system. (See **CONSTITUTIONAL LAW**, **CRIMINAL LAW**, **CONTRACTS**). (DM)

**LAW OF CONSERVATION OF ENERGY :** The principle that the total energy of a system cannot change unless energy is taken from or

given to the outside. Thus the law states that the total energy - resting mass energy + kinetic energy + potential energy - of a closed system remains constant; that is, the total value of a particular physical or living system is conserved. Earth is a closed system, therefore, the idea of perpetual growth, as in consumerism or human population growth, is a losing strategy overall. Therefore, excessive wealth generates excessive poverty, excessive land use generates excessive land degradation. (See SUSTAINABLE DEVELOPMENT). (IP)

**LD50** : Dosage of a chemical compound which will result in the death of 50% of test animals given the compound. (AG)

**LEARNED HELPLESSNESS**: describes the behavior of an individual - human or animal - who has learned that an outcome is independent of his or her reaction. For example, if a dog is subjected to captivity it has no control over, it rapidly gives up any attempt to escape even when the possibility to escape becomes available. The condition has profound emotional and physical effects and the loss of control over external events, in some circumstances, may also produce an overall powerlessness. Ironically, the belief that one has lost control over one's fate and is in a helpless situation may be more imagined than real as there are distinctions in the ways individuals view uncontrollable distressing events. Some believe that life's rewards are to be found internally while others rely more on external events provided by others or chance happenings (see WELLBEING, HOPE and ALLOSTASIS). (IP)

**LEEUWENHOEK**: Anton van. A pioneer in the development of microscopes during 1700s and contributed much to the study of food chains and population. (JA)

**LEGAL GUARDIANS** : Individuals empowered by law to make decisions concerning the welfare of persons considered legally incapable of acting on their own behalf, such as minors and mental incompetents. (DM)

**LEGISLATION** : in a modern state, the mode of establishing rules (laws, regulations) by parliaments. Democratic theory distinguishes between legislative powers, executive powers (the government), and jurisdiction. (BP)

**LEGALISM**: The position that ethical action consists in strict conformity to law or rules; cf. antinomianism, rules of practice, situationalism.

**LEIBNIZ, BARON GOTTFRIED WILHELM VON**: (1646-1716) German mathematician and philosopher, he conceived the idea of "possible worlds". There are infinitely many possible worlds, and God created the best of them all: this world. In his play, *Candide*, Voltaire satirized the idea that a world which contains as much tragedy as our world contains can have been chosen by an all-good God as the "best of all possible worlds". (FL)

**LEOPOLD MATRIX**: A large matrix of environmental elements/characteristics in horizontal rows and potential environmental impacts in the vertical columns. For each policy option, the potential impacts are estimated for each element by indicating a 'magnitude' and 'significance' score in Leopold and others in 1971 and is still commonly used in Environmental Impact Assessment. (See ENVIRONMENTAL IMPACT ASSESSMENT, MATRIX METHODS) (MP)

**LEPTIN** a hormone which controls adiposity by signaling the brain's satiety center in the hypothalamus to stop eating, to result of faulty leptin receptors (Greek *lep*"thin"). (IP)

**LEPTON**: (Greek: *leptos* "thin" or "peeled") Leptons, along with quarks and their respective antiparticles, are the irreducible components of

matter. Leptons are simple elemental particles including electrons and neutrinos. (See QUARK, QUANTUM MECHANICS) (MP)

**LESBIAN/ISM:** the homosexual love between two women[in ancient Greece lesbianism was termed trivodismos derived from the verb trivo to rub].. In western mythology, lesbian love had its origins on the island of Lesbos (the homeland of the famous poet Sappho) where friendships between women were at a more developed stage. Sappho was the first to make "Sapphic love" - expressing and cultivating other interests outside the home. The innovation within the then male dominated society of having yearly beauty contests, where female athletes competed in their sector for their own honor along similar lines to the Olympic Games, was established in Lesbos. It is said that Sappho was to young women what Socrates was for his male students (see SAPPHO OF LESBOS). (IP)

**LESS DEVELOPED COUNTRY:** Another phrase in the search for a politically-correct description of not so wealthy nations, the Less Developed Country is synonymous with the 'Third World', 'South' or 'Developing Nations'. (See DEVELOPING NATIONS, SOUTH, THIRD WORLD, FOURTH WORLD) (MP)

**LETHAL :** Causing or able to cause death, as in lethal dose (toxins) or lethal radius (explosives). (MP)

**LEUKOTOMY:** literally "cutting the white matter", a neurosurgical procedure in which the nerve fibers in the bundle of white matter in the frontal lobe of the brain's cortex are cut in order to interrupt transmission, thereby isolating the prefrontal cortex from the rest of the cerebral cortex; that is, the frontal lobes cease to play any part in the patient's life. White matter is the term used for the fiber connections between groups of brain cells and in this case the nerve connections between the frontal lobes and the rest of the brain are severed a wire loop passed through the bony orbit of the eye. The procedure is adopted for the treatment of an extended variety of mental disorders; particularly violence, personality disorders, intrace depression and pain. The operation was developed by a Portuguese neurosurgeon, Egaz Moniz (1875-1955), who heard of an experimental procedure whereby lesions of the front part of the brain suppressed "neurotic" behavior in monkeys. At a time when brain function was little understood and drugs for severe psychiatric conditions were not available, leukotomy was considered - right up until the s - to be a more humane treatment to calm down severely agitated and aggressive patients. Other routinely used alternative treatments for mentally ill patients included straitjackets, isolation in padded cells, or insulin injections to induce comas. The procedure is seldom performed these days because, while in many cases it does make the patients calm, it also has many undesirable effects such as personality change including aggression, other socially unacceptable behavior, incontinence, apathy and complete lack of motivation (see FRONTAL LOBE; ELECTROCONVULSIVE THERAPY AND SEROTONE-UP TAKE INHIBITORS). (IP)

**LEXICOGRAPHY:** The attempt at discovery, definition and description of the meanings of words, such as in the writing or compilation of a dictionary. A dictionary or encyclopedia is a snapshot of the current range in an evolutionary passage of memes, a reflection of language, culture and philosophy. For example, in Jean-Luc Godard's dystopian science fiction film *Alphaville*, future society has replaced the Bible with a socially-conforming dictionary but one without any entry for the word "*conscience*". (See DEFINITION, MEME, SEMIOTICS, CONSCIENCE) (MP)

**LIBERAL DEMOCRACIES** are intended to be neutral systems in which the citizens can believe and value whatever they wish within the rule of law. This model has proved immensely successful (see LIBERAL UTILITARIANISM) *in some places , although in others. Eg German social democracy, it was less successful.*

**LIBERAL UTILITARIANISM** : Owing to the short-comings of libertarianism, communitarianism and socialism, liberal utilitarianism has evolved and been embraced by some of the most successful democracies such as Denmark and other Nordic European countries who have advanced policies based on both liberal and egalitarian principles. Liberal utilitarianism states that individuals should be left free to make their own choices provided that the consequences of their decisions are not likely to have an adverse effect on the basic needs of others. The distinguishing feature between liberal utilitarianism and libertarianism is that in the former other people's needs are taken fully into account in ethical and political decision-making. For example, affluent libertarian nations are not obliged to donate food to nations in need since they do not recognize an obligation to share their wealth with others, but nations who have taken on liberal utilitarian ideals, are obliged to help because they recognize individual and collective responsibilities towards others. In health care policy, for example, liberal utilitarianism stands for an extensive system of socialized medicine, accompanied with a passionate respect for the autonomy of patients and other users of the services; that is, democracy in this model stands for both concern for the wellbeing of the population and consideration towards the privacy and freedom of individuals. (See UTILITARIANISM; LIBERTARIANISM ; COMMUNITARIANISM; SOCIALISM; DEMOCRACY). (IP)

**LIBERTARIANISM** : An ethical and political philosophy which promotes that the citizens appoint for themselves a governing body which is entitled and obligated to protect the rights of its citizens to liberty, life, health and private property without the illegitimate interference of others. Within the libertarian model, those in government should not take any redistributive measures; that is, they should not collect taxes from one group of citizens and then spend it on services which satisfy the needs of another group. Interpreting this within the health care sector, for example, it means that the state should not arrange any kind of socialized medicine, and that health care services ought to operate primarily on the principles of the free market, and secondarily on the basis of charity. Medical legislation is needed only to protect individuals against fraudulence and malpractice. The implication is that ethical choices should be left almost exclusively to those who pay for the services rendered by health care professionals and biomedical research groups. For example, if an individual wants to have a particular contraceptive, an abortion, or a specific surgical procedure, this choice is limited only by his/her finances and by the capacity to find a physician offering these services. On the other hand, if the executives of a business enterprise endeavor to develop new gene-splicing techniques, they are free to proceed provided that they do not unduly threaten another's life, liberty or property in the process. (See LIBERAL UTILITARIANISM; UTILITARIANISM; COMMUNITARIANISM; SOCIALISM; DEMOCRACY). (IP)

**LIBERATION**: Freedom from something that inhibited or oppressed a person. ( See FREEDOM, LIBERTY.) (DM)

**LIBERTARIANISM** : See FREEDOM, LIBERTY.

**LIBERTY**: Free to do what one likes. (DM)

**LIBRARY**: A collection of clones in no obvious order whose relationship can be established by physical mapping. Compare *genomic library* . (DM)

**LICHENS**: (Greek: *leikhen* "licker"). Lichens are organisms formed by the symbiotic association of a fungus, forming the vegetative body, and either cyanobacteria or unicellular algae undergoing photosynthesis. Lichens are often seen as green, gray or yellow crust-like forms growing flush on rocks or tree-trunks. The symbiotic combination functions so effectively that lichens flourish in some of the harshest environments on earth such as the extreme cold and aridity of Antarctica. They are however very sensitive to air pollution since they cannot

excrete toxic substances. Lichen die-back has been used as an effective biological indicator of rising pollution levels (see INDICATOR SPECIES, SYMBIOSIS) (MP & IP)

**LIEBER CODE** : Perhaps the first expression of modern military law, the Lieber Code, or Instructions for the Government of Armies of the United States in the Field, was compiled by Franz Lieber for Abraham Lincoln in 1863. (See HAGUE CONVENTIONS, GENEVA CONVENTIONS, INTERNATIONAL HUMAN RIGHTS LAW, CLAUSEWITZ) (MP)

**LIES** : Honesty, openness and reasons (containing truth) are distinct from lies, which include dishonesty (deliberate untruth), excuses (dubious correlation to truth), exaggeration (embellished truth), euphemism (covert truth), bluff (implied truth), white lies (minor untruth), black lies (serious untruth) and secrecy about issues relevant to another (withheld truth). (See HONESTY, OPENNESS, SECRECY, EUPHEMISM, POLITICS) (MP)

**LIFE** : The self-reproducing capacity of living organisms is the best-recognized characteristic of life, but the continuum between life and non-life has a shifting borderline depending on the inclusiveness of the definition. The originally recognized qualities of life were birth, growth and death. This requires the extraction of energy from the environment for metabolism, nourishment and healing, followed by its relinquishment during death and decay. A mystical or spiritual component was also considered necessary to activate the living, a "vital force" which elevated life from inanimate matter. The Darwinian revolution highlighted other defining capacities of life: replication, adaptation, variation, heredity, and evolution by natural selection. Complexity theory added another characteristic; life displays complex system behavior such as high levels of organization and emergent properties. Modern biochemistry has further narrowed the definition, with the fact that life as we know it contains molecules acting as a genetic "program", the DNA blueprint. Further, there is a general reluctance to relinquish the organic status of life, which is founded on carbon based compounds in an aqueous medium. However, such a definition of life may be too narrow, since it appears probable that life exists in other parts of the universe, and possible that other bases such as silicon may equally provide the characteristics of origin, energy use, inner program, replication, adaptation, heredity, complex behavior and evolution. (See ARTIFICIAL LIFE, ALIEN LIFE, BIODIVERSITY, EXTINCTION) (MP)

**LIFE CYCLE**: The passage or 'ontogeny' of an i reproduceproductive bout), iteroparity (energy conserved for return bouts), survivorship curves (reverse of mortality) and fecundity schedules (reproductive timing). (See ONTOGENY, AGE DISTRIBUTION) (MP)

**LIFE CYCLE ASSESSMENT**: Life Cycle Assessment (LCA) is a method used in environmental science, industrial design and commercial research. LCA is a model which examines the impacts of a product through its life cycle from extraction, transport, manufacturing and marketing through to use and disposal. (See ECOLOGICAL FOOTPRINT, PRESSURE/STATE/RESPONSE MODEL, ENVIRONMENTAL FLOWS) (MP)

**LIFE EXPECTANCY**: See HUMAN IMMORTALITY, LIFE EXTENSION.

**LIFE EXTENSION**: The development or use of techniques for retarding the process of aging. (See LIFE EXPECTANCY, HUMAN IMMORTALITY) (DM)

**LIFE INSURANCE**: Insurance that will pay a benefit to family or appointed persons upon the insured person's death. In many countries it is necessary in order to obtain a mortgage or bank loan. (See GENETIC DISCRIMINATION).(DM)

**LIGHT YEAR:** A unit of distance in space, defined as the distance light can travel in one year ( $9.46055 \times 10^{15}$  meters). Alpha Centauri, the star closest to our Sun, is about 4.5 light years away. (See ASTRONOMICAL UNIT) (MP)

**LIKERT SCALE:** A common survey method developed by R Likert in 1932 for measuring respondent attitudes towards a certain question or satisfaction with a particular decision or state of affairs. The Likert scale is typically a three, five or seven-point scale such as 'strongly agree', 'agree', 'undecided', 'disagree' and 'strongly disagree'. The question and the items on the scale must be designed to represent only one continuous dimension of the problem. (MP)

**LITTORAL:** (Latin: *littorālis* 'shore') Existing on or pertaining to a shore; the shoreline environment of a lake, river or sea. (MP)

**LIMBIC SYSTEM:** first used by the French anatomist Paul Broca in 1878 to describe that part of the brain surrounding the brain-stem and lying beneath the neocortex. It includes the hippocampus, olfactory regions, hypothalamus and amygdala. Functionally, the limbic system is concerned with 1. visceral processes maintaining homeostasis 2. monitoring emotions particularly ones associated with fear, anger, fight and flight 3. adaptive integration of behavioral response patterns essential in the development of social and nurturance skills. (See BRAIN NEUROTRANSMITTERS; DOPAMINE). (IP)

**LIMBO:** In Catholic teaching, an alternative place for souls which are neither in heaven nor in hell. The two primary reasons for souls to be in Limbo are: a) souls of those who died before the arrival of Jesus. These souls did not have the benefit of Jesus' sacrifice, and so, they are in Limbo, because even though they may have been righteous, this is still not sufficient for their entry to heaven. b) souls of infants and unborn children who did not commit any sin themselves, but did not receive the benefit of Jesus' sacrifice either. (AG)

**LIMITING FACTOR:** An element of a process which acts to restrict the rate, magnitude or quality of an outcome. In chemistry, the rate-limiting factor holds up the flow of a chemical reaction. In ecology, limiting factors which control populations may be density-dependent limits (e.g. carrying capacity limitations such as food, predation and shelter) or density-independent limits (factors unrelated to population, e.g. weather, hazards, environmental disruption). (See LIMITS TO GROWTH, LIMITS OF ACCEPTABLE CHANGE) (MP)

**LIMITS OF ACCEPTABLE CHANGE:** See CARRYING CAPACITY, LIMITS TO GROWTH.

**LIMITS TO GROWTH :** A 1972 book edited by Donella Meadows and Dennis Meadows, and published by the Club of Rome, that projected the future results of trends in population, industrialization, resource depletion, food production, and pollution. The primary conclusion was that if these trends continue, then rapid declines in population and industrial capacity are likely to result. The publication of this book stimulated both the environmental movement and business-as-usual interests, and it remains controversial. (RW)

**LIMNOLOGY:** (Greek: *līmno* "lake"+ *logos* "reason") The scientific study of fresh water, such as the geography and ecology of lakes and streams. (MP)

**LINGAM:** From Sanskrit, the lingam refers to the penis or masculine gender, sometimes represented in Hindu phallic images or statues. (See YONI) (MP)

**LINGUA FRANCA:** A medium used for communication between people of different languages, commonly 'World English'. A pidgin is a type of localized lingua franca, and Esperanto was an attempt at a global lingua franca. (See PIDGIN, ESPERANTO, MULTIMODAL COMMUNICATION, TRANSLATION SOFTWARE) (MP)

**LINGUISTICS:** Linguistics, originally known as philology, is the scientific study of languages, including vocabulary, grammar, style,

phonetics, semiotics, lexicography, linguistic evolution, artificial languages, translation, the philosophy of language and the relation of these to human thought and behavior. Linguistic relativity/determinism is the idea that the characteristics of a language dictate cultural and world outlook. Biological linguistics investigates language in relation to human evolution, child development and neurological processing. Psycholinguistics studies language in relation to memory, attention, comprehension and mental health. Sociolinguistics investigates language as a reflection of social function and cultural diversity. A linguist is a person who studies the structure of language and/or is able to speak and translate multiple languages. Famous philosophers of linguistics include Saussure, Bloomfield and Chomsky. (See LEXICOGRAPHY, DEFINITION, ARTIFICIAL LANGUAGES, PIDGIN, SEMIOTICS, SEMANTICS, EUPHEMISM, TRANSLATION SOFTWARE, MULTIMODAL COMMUNICATION) (MP)

**LINKAGE:** The proximity of two or more markers (e.g., genes, RFLP markers) on a chromosome; the closer together the markers are, the lower the probability that they will be separated during meiosis and hence the greater the probability that they will be inherited together. (DM)

**LINNAEUS, CAROLUS:** (1707-1778) Swedish naturalist. Linnaeus established the system of taxonomy for plant species in *Species Plantarum* (1753) and for animal species in *Systema Naturae* (1758). He served as a professor of botany at the University of Uppsala, and ten years after his death, the Linnaean Society of London was established to continue his work on taxonomy of plant and animal species. (AG)

**LITERACY RATE:** The proportion of a population that read and write. (DM)

**LITHOSPHERE:** Refers to areas of the surface of the Earth not covered by water (see BIOSPHERE & HYDROSPHERE). (IP)

**LITHIUM:** A most reactive silver-white metal. Its salts; such as lithium carbonate, are effective in stabilizing recurrent manic-depressive cycles, although its mechanism of action by which they help return homeostatic flexibility to emotional behavior, is not clear. Mood-stabilizing drugs are essential modern tools in the long-term management of manic depression (or bipolar illness), and lithium carbonate was the first drug to be discovered with therapeutic properties. Since lithium is not effective in all who suffer bipolar illness, during the 1980s a group of drugs already successful in the treatment of epilepsy - the anticonvulsants - have become a valuable addition to its treatment. The usefulness of lithium in mania was serendipitously discovered in the late 1940s by John Cade, an Australian psychiatrist. While seeking a toxic agent in the urine of psychotic patients, Cade combined lithium with uric acid to make the latter more soluble in water in order to inject the compound into guinea pigs who, in turn, became very quiet without falling asleep. By an intuitive leap, Cade decided to give lithium salts to several agitated and manic patients who were under his care. One of the first patients Cade treated had been in the hospital, chronically manic, for five years, yet within three weeks he was "*enjoying the unaccustomed and quite unexpected amenities of a convalescent ward*", and after three months he was so improved that he left the hospital to return to work and to his family. This extraordinary discovery has revolutionized the pharmacological treatment of manic-depressive illness and lithium salts are now used widely across the world. However, the toxicity of lithium in high doses to the heart and kidney is of concern, and there are also other adverse side-effects such as stomach upsets and hand tremors. In common with the anticonvulsants, lithium reduces the excitability of the neuron, probably by changing the dynamics of the ions passing back and forth through the membrane wall. In addition, lithium alters the balance among the neurotransmitter operating systems of the limbic system, strengthening the serotonin messenger system which is important in preventing depression. Manic depression is the most predictable recurrent mood disorder. Approximately 95% of those who suffer mania will experience recurrent manic or melancholic episodes throughout their lives, and before discovery of lithium many became irretrievably ill (Greek *lithos* stone) (see DEPRESSION; UNIPOLAR DEPRESSION; BIPOLAR DEPRESSION; BRAIN NEUROTRANSMITTERS, SEROTONIN RE-UP TAKE INHIBITORS;



**ELECTROCONVULSIVE THERAPY; LIMBIC SYSTEM).** (IP)

**LIVE ABORTED FETUS:** When an aborted fetus is alive, in many countries if doctors wish to perform experiments legally they must seek statutory authority. Some consider it is a person, no matter how short the period of gestation and using it for an experiment would in law be at least an assault upon it. (JA)

**LIVE DONOR:** A term used to refer to a person who remains alive after donating part or all of an organ, e.g. one kidney or part of a liver, to another person. (DM)

**LIVING:** A recognition of the self-reproducing capacity of alive organisms.

**LIVING DICTIONARY:** A living dictionary is a dictionary which is never finished. Its authors hope to keep adding, deleting and improving entries for many years to come. Readers are invited to take part in this process, submitting new entries or additions or revisions to old ones. In this way a living dictionary can continue forever. The idea of a living book, with no limit to its size, its changes or the number of its authors, recognizes the limitations of human intelligence and the fact that knowledge is never finished, but can always grow and improve. This dictionary is a living dictionary. (FL)

**LIVING MODIFIED ORGANISMS:** The term used to refer to living Genetically Modified Organisms in the Cartagena Protocol of the Biodiversity Convention. (See CARTEGENA PROTOCOL OF THE BIODIVERSITY CONVENTION, GMOs). (DM)

**LIVING RELIGION:** A self-regulated set of behavioral mores.

**LIVING WILL:** Written, witnessed declarations in which persons request that if they become disabled beyond reasonable expectation of recovery, they be allowed to die rather than be kept alive by extraordinary means. (see advanced directives). (DM, +IP+FL)

**LMOs:** See LIVING MODIFIED ORGANISMS.

**LOBOTOMY:** See LEUKOTOMY.

**LOCAL KNOWLEDGE:** See INDIGENOUS KNOWLEDGE, PUBLIC OPINION.

**LOCKE, JOHN:** (1632-1704) English physician, political theorist and philosopher. He is thought of as the father of liberal democracy, urging in his "Letter Concerning Toleration" a free society where all beliefs, especially in religious matters, are to be allowed and their expression is to be permitted. Locke makes exceptions, however. Adulterers, whom he classes with thieves and murderers, are not to be allowed. Nor are atheists, who -- Locke says -- cannot be trusted to keep their promises.

Locke's political writings, especially the Second Treatise on Civil Government, gave the ideological explanation of the Glorious Revolution, which forced the abdication of James II, and brought William of Orange from Holland, to rule England with highly limited powers. This idea of a monarch whose powers are limited by an agreement with the people who crowned him, is explained in Locke's political writings as the "Social Contract". Although the idea appeared earlier, in the writings of John Milton, who wrote ideological pamphlets for Cromwell's revolution earlier in the same century, Locke usually gets the credit. The idea of a social contract between people and sovereign, with the sovereign having those, and only those powers which the contract grants, is the source of the "contractual model" of the physician-patient relationship, which one often sees in the bioethics literature. (FL)

**LOCUS:** The position on a chromosome of a gene or other chromosome marker, and also the DNA at that position. Some restrict use of locus to regions of DNA that are expressed. (See GENE EXPRESSION and ALLELES).

**LOD SCORE (Logarithm of the Odd):** Measures the likelihood that two loci rest in close proximity on a chromosome. In linkage analysis

studies, multiple loci are probed to search for a candidate gene for the disease. The LOD score values  $\geq 3$  indicate there is a 1000:1 probability that the marker and the disease locus are close one from another, whereas values  $\leq -2$  indicate the probability of proximity is 1:100, excluding the gene from that chromosomal region. (GK)

**LONELINESS:** An experience of absence and unhappiness involving longing for human companionship, and feeling as though there are no inner or outer connections within oneself or to other people. It is different from being alone, as solitude can be an invigorating experience. Loneliness is most common during a transitional period following the loss of a friend or loved one. (See SOLITUDE) (MP)

**LONGITUDINAL STUDY:** A study or survey which extends over a certain period or is repeated at certain intervals in order to analyze changes over time. (See TIME-SERIES DATA, MONITORING, CROSS-SECTIONAL STUDY) (MP)

**LOVE:** 1. an intense affectionate concern for another living organism or object 2. the biological imperative for humane survival 3. an intense sexual desire for another person. Love often becomes the last refuge or common denominator and has been given other names: God, the soul, values (see LOVE OF LIFE; UNCONDITIONAL LOVE). (IP)

**LOVE OF LIFE:** The concept of Bioethics as the Love of Life was developed by Darryl Macer in 1994, and was the title of his 1998 book. The ethical ideals of self-love, Loving others, loving good and loving life are used to help resolve moral dilemmas. (DM)

**LOVELOCK JAMES:** See GAIA HYPOTHESIS.

**LOW BIRTH WEIGHT:** A birth weight of 2500 grams (5 lb., 8 oz.) or less, in the USA. As technology develops the weight of a baby at birth that places them at danger decreases. As nutrition improves the average weight may increase, so each country may define this differently. (DM)

**LOW FREQUENCY ACTIVE SONAR:** Recently developed US military technology designed to detect 'quiet' submarines. The technology in the Bahamas and Canary Islands, in which rare beaked whales, among others, washed up with hemorrhaged eardrums. (See SONAR, SUBMARINE, NUCLEAR SUBMARINE) (MP)

**LREC:** Local Research Ethics Committee, United Kingdom.

**LSD:** See HALLUCINOGENS, PSYCHEDELIC LEARNING.

**LUST:** 1. sexual desire; 2. some other strong primal urge. (RW)

**LYME DISEASE :** A disability disease caused by the bacteria *Borrelia burgdorferi* . No vaccine has been developed, but research is ongoing. (JA)

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## M

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<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**MAB:** Man and Biosphere Program; Monoclonal Antibody.

**MABO CASE :** In 1992 the High Court of Australia upheld the claims of the Meriam people of Murray Island, represented by Edy Mabo, maintaining that since they had continually occupied their land they had a legitimate native title claim to it and, therefore, land rights. This legislation led to the establishment of Land Councils across Australia to administer land, community legal claims, act as advisory council on issues of heritage and so on. Native Title Legislations and Anti-Discrimination Acts were tangible achievements reflecting an increasing community desire for spiritual reconciliation and healing (see RECONCILIATION), particularly following the 1987 Royal Commission into Aboriginal Deaths in Custody which found that high levels of Aboriginal incarceration were the result of inequities experienced by Aboriginal people (see NATIVE TITLE LEGISLATION - AUSTRALIA). (IP)

**MAC :** See MAXIMUM ACCEPTED CONCENTRATION.

**MACHINE GUN:** See AUTOMATIC WEAPONS.

**MACHINE TRANSLATION:** See TRANSLATION SOFTWARE.

**MACRO- :** Combining prefix indicating large, great, long (as opposed to micro-), from Latin *makrós* . Macro-scale systems include habitats, ecosystems, communities, cities, nations etc. (See SCALE, MICRO-, MEGA-, META-, TRANS-, INTER-) (MP)

**MACROECONOMICS:** The branch of economics which investigates monetary policy in terms of aggregate economic statistics at a national level, such as budget and trade deficits and overall growth, unemployment and interest rates. (See MICROECONOMICS, ECONOMY) (MP)

**MAD:** 1. Commonly used word meaning ‘insane’. (See INSANITY) 2. Appropriately chosen acronym standing for “Mutually Assured Destruction” - the likely outcome of anyand today perhaps also between more recently-declared nuclear states such as India and Pakistan. (See NUCLEAR WEAPONS, DETERRENCE, COLD WAR) (MP)

**MAD COW DISEASE:** See BOVINE SPONGIFORM ENCEPHALOPATHY .

**MADNESS:** See INSANITY.

**MAGIC MUSHROOMS:** See PSILOCYBIN.

**MAGNETIC RESONANCE IMAGING:** See MRI.

**MAHAVIRA:** (meaning "Great Hero") The Title of Vardhamana (599-527 bce). Vardhamana is held to be the last of a series of 24 ancient

teachers of the traditions of Jainism, known as "Tirthankaras" (ford makers). (AG)

**MAIMONIDES, MOSES (MOSHE BEN MAIMON):** (1135-1204) Physician, philosopher and rabbi, he lived in Spain and Egypt. His writings on Jewish Law, medicine and philosophy, are an integrated whole. Observance of Biblical commandments keeps the body healthy and frees the mind from emotional pressures and addiction to material pleasures. So the mind can concentrate on active, intellectual activity. Just as Aristotle claimed that one who exercises the intellect is most beloved by the gods, Maimonides claimed that one comes under the protective supervision of God to the extent that one exercises one's intellect.

Maimonides describes Nature as if it had a mind, calling it "wise and crafty", and believing that it always strives for our health and the health of other creatures. Although there are what we call today genetic mutations, what nature does for the most part tends to be good and healthy. So a doctor should try to intervene as little as possible with a patient, allowing nature to cure itself. Only if this does not work should one try treatment, starting with treatment by way of the mind: especially by combating depression. Only if this does not work may one try medicine, starting with easy treatments and then using harsher ones only as a last resort.

Maimonides did not believe that one should turn to a doctor for every health need. One should become aware of one's own body, learning what foods, exercise and way of life are best for us. There are no universal rules in medicine because every person is different. The right diet, way of life or medicine for one person is not necessarily right for someone else. Modern medicine is just becoming aware of this fact, especially through genetic medicine, which is helping us learn the clinical importance of individual differences. Becoming aware of the individual health needs of one's own body, and discovering for oneself the way to health, with minimal dependence on physicians, would be an authentic autonomy.

As a physician, rabbi and philosopher, he was Israel's first interdisciplinary bioethicist. Angels, sometimes indistinguishable from the gods of Shinto and Hinduism, played a central role in his philosophy. He personified Nature as wise and crafty, bringing living organisms into existence, preserving them and always seeking their health. He therefore urged the physician to try to let nature cure the patient alone, with little or no interference. If that does not work, then one should try to cure the body psychosomatically, by first addressing the soul. Finally, easy natural treatments are to be preferred to harsh medicines. He urged people to look after their own health, paying attention to the effects of food and various behaviors on one's health, and trying to live accordingly: what is good or bad for one person may not necessarily be so for another. Today's genetic studies of why different foods, environmental conditions and medicines may have different effects on different people, are just starting to give scientific precision to this idea. -

Emphasizing psychosomatics, Maimonides saw worry as a major cause of illness. He said that it is pointless to worry about the past, because the past is already fixed and cannot be changed. It is pointless to worry about the future because the future lies in the realm of the possible. It can always turn out different from what we expected. So it only remains to concentrate on the here and now, without worry. A similar doctrine can also be found in Buddhist philosophy. (FL)

**MAJOR HISTOCOMPATIBILITY COMPLEX:** This huge complex of immune-response genes is located on chromosome 6p21.3. It covers a region of more than 3.800kb. Besides the classical class I, II and III genes, it also encodes DN/DO and 21 hydroxylase molecules. (see also HLA locus class I, class II and class III genes; Pheromone) (GK)

**MAJOR INDUSTRIAL ACCIDENT:** An industrial accident involving the release of toxic/deleterious emission of a gas or a hazardous

substance during an uncontrolled industrial activity resulting in the loss of human lives and long term health impacts. E.g. Methyl Iso Cyanide (MIC) gas release from Bhopal (India) and nuclear fall out from Chernobyl (Russia). (JA)

**MAL-** : Combining prefix indicating wrongness, badness or illness, from Latin: *malus* 'bad'. (See PSEUDO-, ANTI-, META-) (MP)

**MALE** : Organisms whose reproductive organs produce only male gametes; that is, sperm in animals or pollen in fruit-bearing plants. (See FEMALE). (IP)

**MALE INFERTILITY:** See INFERTILITY.

**MALEFICENCE:** [Latin *maleficentia* doing ill] Committing harm, hurtful or disrespectful to, of evil criminal nature. (IP)

**MALNUTRITION:** ( *mal* 'bad' + 'nutrition') 1. Insufficiently nourished. (See NERVOUS, OBESITY, FAMINE, FOOD CRISIS, FOOD AID) (MP)

**MALPRACTICE:** In law, failure of a professional to exercise a reasonable degree of skill and care. (See NEGLIGENCE, MISCONDUCT). (DM)

**MALTHUS, THOMAS ROBERT:** (1766-1834)- Author of "An Essay on the Principle of Population". In addition to his research on population growth, his achievements in the field of economics are also impressive. However, most influential was his work on population. Darwin developed some of his ideas of the theory of natural selection from Malthus' essay. The adjective "malthusian" is used to refer to predictions of large growth in population. Malthus' essay on population is of particular relevance to questions of population growth and food supply. (AG)

**MAMMALIA:** The homeothermic (warm-blooded), hairy, milk-suckling vertebrates of the class Mammalia. Extant taxa are the Monotremata (echidnas and platypus), Marsupialia (kangaroos, koalas, etc.), and Eutheria (placental mammals). (RW)

**MAN:** A man is an adult human male, but the term was also commonly used to refer more generally to the human species as a whole, as in "the evolution of Man". Such male-centric language is outdated in the modern context of equal rights and status of men and women - humans or humanity are preferable alternatives to the term. (See HUMAN, *HOMO SAPIENS* , MALE) (MP)

**MANAGED CARE or MANAGED CARE PROGRAMS:** Health insurance plans intended to reduce unnecessary health care costs through a variety of mechanisms, including economic incentives for physicians and patients to select less costly forms of care, programs for reviewing the medical necessity of specific services, increased beneficiary cost sharing, controls on inpatient admissions and lengths of stay, selective contracting with health care providers, and the intensive management of high-cost health care cases. (See HEALTH INSURANCE, HEALTH MAINTENANCE ORGANIZATIONS, HEALTH CARE DELIVERY). (DM)

**MANDATORY DRUG TESTING:** Drug testing that is compulsory, required for some employees of companies. The consequence of refusal may be dismissal from the job, or in the case of military staff, some punishment may be effected. (See **DRUG TESTING**) (DM)

**MANGROVE FOREST:** The mangrove forest habitat is located along tropical and subtropical estuaries and coastal intertidal zones, often fringed seaward by seagrass habitat and landward by saltmarsh habitat. Many mangrove species occur from 20 families (e.g. 39 species in Australia including *Avicennia integra* and *Rhizophora stylosa* ). Mangrove trees are salt-tolerant and ‘breathe’ through roots to rejuvenate fish stocks. (See ESTUARY, SEAGRASS, TROPICAL RAINFOREST, SCLEROPHYLL FOREST, HABITAT TYPES) (MP)

**MANIA:** An elevated mood or state of mind, often associated with bipolar depression or drug use, characterized by pathological enthusiasm, flight of ideas, energy, elation, extravagance, obsession, overconfidence, distractibility and delusion. The sufferer of mania may have optimism and confidence and may or may not be concerned by their own indiscreet behavior, pressure of speech, inflated grandiosity and other impaired social functions. (See BIPOLAR DEPRESSION, LITHIUM) (MP)

**MANIC DEPRESSION:** See BIPOLAR DEPRESSION.

**MANUFACTURING CONSENT:** See PROPAGANDA.

**MANUSMRITI (THE LAWS OF MANU):** First systematization of sacred Hindu law, composed around 1500 BCE. The twelve extant books of the Manusmriti are attributed to Manu, the mythical father of Hindu moral and social law. (MP)

**MAO:** See MONOAMINE OXIDASE.

**MAORI:** The indigenous people of New Zealand – Aotearoa (Maori name for New Zealand), who are thought to have immigrated to New Zealand about 1000-1300 A.D. (DM)

**MARDI GRAS:** 1. A world-famous vibrant and gaudy city parade featuring wide-ranging partying and high levels of crime which takes place annually in Rio de Janeiro, Brazil. 2. The Gay and Lesbian Mardi Gras is a famous annual event in Sydney, Australia, including risqué street parade advocating homosexual rights and lifestyles. (See MARDI GRASS, PROTEST) (MP)

**MARDI GRASS:** Colorful parade, anti-prohibition rally and community direct action advocating the decriminalization of marijuana, taking place for example annually in Nimbin Australia, and other places such as organized ‘smoke-ins’ on some university campuses. (See DECRIMINALIZATION, CRITICAL MASS, RECLAIM THE STREETS, CIVIL DISOBEDIENCE, NONVIOLENT DIRECT ACTION) (MP)

**MARIJUANA:** Marijuana, also known as dope, pot, weed, buds, grass, leaf, mull, Mary-Jane, reefer, kif or ganja, is a psychoactive recreational drug consisting of the dried flowering buds and leaves from plants of the genus *Cannabis* (hemp), containing the active ingredient tetrahydrocannabinol (THC). Despite its illegality, statistics show a remarkably high overall use and increasingly at a younger age. Among the 15 to 35 year age group, for example, it is often considered an ordinary part of social life. Marijuana and its stronger resinous form hashish have dose-dependent effects on mood, perception, cognition and psychomotor coordination. Users experience feelings of relaxation, euphoria, childishness, lateral thought, time distortions, enhancement of taste and touch, omniscience and ease, in which emotions are enhanced and everything seems more profound. Heavier doses cause difficulties in concentration, "tunnel" attention, anxiety, paranoia, hallucinations and sleep, but since the drug does not affect the brain's respiratory center death by overdose is highly unlikely. Pot smokers are rarely aggressive or belligerent whilst under its influence (peacenik hippies are a dope cliché ) although they may become irritable during comedown or

withdrawal. Marijuana does not produce severe withdrawal symptoms but is addictive as it induces dependence, as seen by continued use despite adverse consequences especially when mixed with tobacco where the habit can also generate a nicotine addiction. However, statistics indicate that the majority of addicts give up by their 30s, probably because of the adverse life-impacts from regular use, especially considering the increasingly potent THC content of modern hydroponic weed. With the increased tolerance and dependence of frequent intake, the previous enhancement of creativity and philosophical insight may be replaced by mental dullness, memory impairment, learning difficulties, communication problems, sleeping disorders, paranoia in interaction with "straights", and possibly transient psychosis. Another common behavioral disorder is amotivational syndrome, in which lethargy and apathy in the "pot-head" can cause impairment of relationships, academic activity and other work-related performances. Amotivational syndrome is resolved on quitting. Other serious risk factors are exacerbation of preexisting mental illness especially schizophrenia, and increased likelihood of severe depression if coincidental with emotional crises and other extraneous stresses. Regular use also decreases levels of the male hormone testosterone, which should alert users about paternal responsibilities in matters of reproduction; particularly since research has established a significant correlation between heavy marijuana use during pregnancy and impaired fetal growth and development. As for cigarettes, so for dope - prolonged smoking leads to impaired pulmonary function, emphysema, and risk of mouth, lung and especially throat cancers. These physical risks are increased by the typical smoking techniques: pipes and water pipes ("bongs") are very hot, pot cigarettes ("joints") are inhaled deep, holding in the smoke, and the synergistic effects with tobacco may be higher by an order of magnitude when compared to the risk of either separately. Alternative methods of intake include the use of a vaporizer to minimize the inhalation of tar, or incorporation into foods such as cookies. There is no evidence of progression to harder drugs as a result of occasional social cannabis use progression and heavy use may indicate a preexisting addictive personality. Likewise there is no evidence that marijuana use leads to other criminal behavior. Dope interferes moderately with hand-eye motor coordination thus risking motor vehicle accidents, though driving impairment is less affected compared with alcohol intoxication because the driver tends to drive more carefully. There has been much media and political dialogue in recent years about the decriminalization of marijuana. Statistical comparisons between the long-running Dutch experiment in decriminalization and other Western countries have concluded that the decriminalization of dope makes very little difference to its social patterns of use. Marijuana has been identified as having a variety of medical uses including pain control, appetite enhancement (the "munchies", e.g. for AIDS), as a muscle relaxant, as an anti-nausea and anti-emetic (e.g. chemotherapy), and as a treatment for glaucoma. (See DOPE, CANNABIS, HASHISH, THC, AMOTIVATIONAL SYNDROME, QUITTING SMOKING). (IP+MP)

**MARINE ENVIRONMENT:** See MARINE PROTECTED AREA, ESTUARY.

**MARINE PROTECTED AREA:** See NATIONAL PARK, MULTIPLE USE AREA.

**MARKER:** An identifiable physical location on a chromosome (e.g., restriction enzyme cutting site, gene, RFLP marker) whose inheritance can be monitored. Markers can be expressed regions of DNA (genes) or some segment of DNA with no known coding function but whose pattern of inheritance can be determined. (DM)

**MARKER GENE:** A gene for expressing a protein which makes the cells or organisms with the gene, e.g., to provide tolerance to antibiotics. A selected gene with a characteristic feature for gene transfer. (JA, DM)

**MARRIAGE:** the legalized union between husband and wife. Since prehistory, the institution of marriage has passed from one society to another in different forms (e.g., abduction, straight purchase, legitimized property and economic agreement such as a dowry, organized



competition among the perspective suitors, monogamy, polygamy etc) but always retained a positive sacred social value because through it humans reproduced themselves. The importance of marriage in the conscience of our distant ancestors is well illustrated in western mythology where Zeus, right after establishing his authority on mount Olympus, legitimized his relationship with Hera through marriage. From the ethical point of view, a couple demonstrates through marriage their desire to produce children as fertility insured a kind of immortality. (See DIVORCE, CONCUBINE). (IP)

**MARSUPIALS:** See MONOTREMES, EUTHERIAN MAMMAL.

**MARTIAL ARTS:** People have fought one another during most of the times known to history and archaeology. But a distinction should probably be drawn between purely physical techniques, on the one hand, and what the Japanese call *kamiwaza*, ie Divinely Inspired techniques, on the other. The warriors of the Bible seem to have known *kamiwaza*. It is also present in the more ancient Japanese schools, like Kashima Shinryu. More modern schools, like Aikido, which were developed from ancient schools, may also have *kamiwaza*. Martial arts are bioethically relevant because of the spiritual elements and because of the ethic which warriors have developed, and which insists on principles like honour, honesty, fairness and deep human relationships in the most difficult of situations. It is easy to be ethical while teaching a philosophy class, but much harder when contending with terror attacks.

In the last century, martial arts went through a period of time when spiritual development was considered the most important thing, and many people, in the more peaceful parts of the world, ignored practical application for defence of oneself and others. People in some parts of the world, however, have been contending with war and terrorism with little interruption for many years. People elsewhere could ignore real life until late 2001. But after the September attack on New York and Washington, and after the navy of formerly pacifist Japan had to engage in a fire fight in December, the revival of warrior ethics has become a necessity. We would all rather not fight. But if we have to fight, let us learn to do so ethically and with inner calm and peace. (FL)

**MARTYR:** From old English and Greek. Literally means a witness. 1-a person who choose to die rather than give up his faith. 2-a person who assumes an attitude of self-sacrifice for his beliefs. 3-In Islamic context the word " Sha'hid" has the same meaning. It means sacrificing one's own life on the way of God's faith. (AB)

**MASOCHISM:** A perverse form of self-defeating gratification derived from receiving physical, mental or emotional abuse. Masochism is a personality disorder in which pleasure is heightened during maltreatment or domination, even to the extent of violence or cruelty, at the hands of another/others. The masochist may need to experience, in reality or fantasy, emotional or physical pain to become sexually aroused. The term is derived from Leopold von Sacher-Masoch (1836-1895), the Austrian historian, cuckold and author of the classic masochist novel *Venus in Furs* which was drawn from his own life and relationships. (See SADISM, SADOMASOCHISM). (IP + MP)

**MASS EXTINCTION:** Mass extinction events are relatively brief periods during which a large proportion of the Earth's existing species are extirpated. They are characterised by numerous extinctions occurring simual nature of the planet. The big five mass extinctions in Earth's history occured at the final stages of the following Periods: experiencing the sixth mass extinction. Regrettably, the current mass extinction event has been driven by human development and expansion, and *Homo sapiens* will not necessarily be excluded from it's catastrophic effects. (See EXTINCTION, HUMAN EXTINCTION) (MP).

**MASS MEDIA:** Instruments of communication that reach large numbers of people; for example, the press, radio, television. (DM)



**MASS SCREENING:** The use of quick and simple diagnostic procedures with large groups of apparently well people for the purpose of detecting the presence or risk of diseases or disorders. (DM)

**MATERIAL FLOWS:** Material flows include abiotic solids (minerals, fossil energy carriers, topsoil etc.), biotic flows (animal harvest biomass, plant biomass etc.), water (surface runoff, groundwater, ocean currents), air (atmospheric gases) and pollution (damaging chemicals, human waste, radioactive materials etc.). ‘Material Flux Analysis’ and ‘Substance Flow Analysis’ are methods for tracking the flow of material inputs, stocks, outputs and wastes. (See ENVIRONMENTAL FLOWS) (MP)

## **MATERIALISM**

**MATERNAL BLOOD SAMPLING:** A term applied to blood sampling from pregnant mothers, usually to assess the health of the fetus. Certain serum protein markers can indicate higher probability of the fetus being suffering from neural tube defects or Down syndrome. Because it is only elevated risk, the followup is normally a more direct fetal diagnosis test. (See AMNIOCENTESIS, CVS). (DM)

**MATERNAL HEALTH:** Health of the mother, while pregnant or raising a child. (DM)

**MATERNAL LOVE:** The love given to a child by a mother. (DM)

**MATERNAL MORTALITY:** The rate of death of pregnant mothers or women giving birth to a child. There is a high rate of mother's death in the case of abortions performed by untrained medical practitioners or women themselves. (See ABORTION). (DM)

**MATERNAL SERUM ALPHA-FETOPROTEIN :** A protein normally secreted by the fetal liver, yolk sac and gastrointestinal tract. Elevated concentration levels of alpha-fetoprotein in the amniotic fluid is used to diagnose early fetal neural tube defects such as spina bifida and anencephaly. The protein concentration is normally low in adults but may be elevated in cirrhosis, alcoholic and viral hepatitis and certain malignancies such as hepatomas and germ cell neoplasm. (See PRENATAL DIAGNOSIS; FETAL THERAPY). (DM+IP)

**MATESHIP:** 1. The condition of being mating partners. (See MARRIAGE) 2. That feeling of fellowship, common bond, *camaraderie* , trust and honor between ‘mates’ or friends. Traditionally a male ethic, such as ‘gentleman’s rules’ or theCULTURAL IDENTITY) (MP)

**MATHEMATICAL MODELING:** Artificially constructed models by the use of computers in order to predict greenhouse or population trends for example. Scientist use these models to make statements or predictions about the world, however, models are only as accurate as the data used in its construction. (IP)

**MATRIMONY:** The bond or union of marriage. (See MARRIAGE) (MP)

**MATRIX METHODS:** A matrix is a rectangular arrangement of data, usually with the unit, subject or individual in a horizontal row and the variables or measures represented by vertical columns. This arrangement facilitates matrix methods of arithmetic, statistics and analysis. (See LEOPOLD MATRIX) (MP)

**MATTER:** Physics: The ‘bricks and mortar’ of the universe,ing substitutable aspects of the same thing ( $e=mc^2$ ). The universe has been theorized also to contain ‘antimatter’ and ‘dark matter’. Matter isQUARK, LEPTON, ENERGY, MATERIAL FLOWS) (MP)

**MAXIMUM ACCEPTED CONCENTRATION** : Commonly abbreviated as MAC. Human body is adopted to a certain threshold value to any substance. The upper limit of tolerance is the MAC., its levels are based partly on scientific evaluation of the available toxicological data and partly by the health based recommended occupational exposure limit. These data may be available with the Health Department. (JA).

**MAXIMUM ECONOMIC YIELD:** The value difference between the costs of inputs and the value of outputs in an economic process. The total cost of inputs should, but often doesn't, include an estimation of environmental, social and ethical costs. (See COST BENEFIT ANALYSIS, MAXIMUM SUSTAINABLE YIELD) (MP)

**MAXIMUM SUSTAINABLE YIELD:** A long-lived but now obsolete term referring to the theoretical threshold level of greatest utilization of a resource such that the affected population or resource neither increases nor decreases. Maximum sustainable yield has given way to 'optimum sustainable yield', which accommodates into management modeling the existence of dynamic ecosystem fluctuations and precaution in the face of uncertainty. (See OPTIMUM SUSTAINABLE YIELD) (MP)

**MD:** Medical Doctor.

**MEAN:** Three types, arithmetic, geometric and weighted. Arithmetic mean is obtained by adding all the data values and dividing by the number of data items, the sample size is indicated by  $n$  and the mean  $\bar{x}$ . Geometric mean is the  $n^{\text{th}}$  root of the product of  $n$  items. Weighted mean is the method of assigning different emphasis or weights to data items. (JA)

**MEAN DEVIATION:** Is a measure of the average amount by which the values in a distribution differ from the arithmetic mean. (JA)

**MEANING OF LIFE:** Bioethical principles like beneficence and non-maleficence have no clinical application in the absence of reflection on the meaning of life. This is not necessarily a religious position because atheists and agnostics also have opinions on the meaning of life. The radical existentialist opinion that life is meaningless, is also an important result of reflection on the meaning of life.

Meaning of life is not identical with QUALITY OF LIFE (q.v.). One who is devoted entirely to chasing physical and aesthetic pleasure might have a life of much quality, but little meaning. But a very sick, dependent, bedridden, depressed patient in great pain, who for the first time reflects on ones good and bad deeds, one relationships with other people, and on our total ignorance of where we came from and where we are going, may have extremely low quality of life and much meaning. Nor is meaning of life identical with sanctity of life. The idea that there are some values more important than life itself, values for which one should be willing to sacrifice one's life, is the idea that a meaningless life is not worth living.

There are three levels to the meaning of one's life: the meaning of one's life in one's own eyes, the meaning of one's life with respect to others, and the metaphysical meaning of one's life, if such a thing exists. We can never be sure about any of these things. We cannot be sure about the meaning of one's life to oneself, because we can always change our minds, see things in a new light, or even come to realize that what we believed to be our own thoughts were really ideas to which we were indoctrinated. Terminal patients often change their minds about whether their continued treatment is worthwhile. Nor can we be sure about what our lives mean to others. A word or a small action today can have unknown and long term effects on our friends, families, students and others. Nor can we really know anything at all about the metaphysical meanings of our lives. Does God exist or not? And if God exists, what is God like? And if we don't know what God is like, what sense can there be in our belief that God exists? And is there life after death? And what is that life like? Heaven and hell, or reincarnation, or perhaps

something so surprising we cannot even imagine it? Or maybe we are just meat, and death is the end of us? Reflection on the meaning of life leads to the conclusion that we cannot know anything about it. Therefore, declarations of whether continuing treatment is "in the interests" or "not in the interests" of a patient, are meaningless declarations. The humility to admit that we really don't know anything about the meaning of life should be the first prerequisite for engaging in clinical ethical decision making. (FL)

**MEASUREMENT:** The collection or quantification of data on location, size, shape, distribution, boundaries, distance, dimensionality or rate of change. Data is obtained through the use of a measuring instrument. Measures are against some standard, for example the meter was defined at different times by a fractional proportion of the circumference of the World, a platinum rod stored in Paris, and currently by the distance light travels over a particular time. Usually parameters or indicators are measured rather than the real population or value. You need to know not just what you are measuring, but what it represents, to what precision and accuracy, and what assumptions or biases may be inherent. Moreover, relativity theory states that measurement is subjective to the measurer's viewpoint, and in quantum theory the act of measurement usually interferes with the measure itself. Complexity theory has also illustrated some of the subjectivities and surement. Nevertheless, measurement is one of our most powerful tools for approximating the true shape of reality, and one of the defining differentiators of science from STATISTICS, MODELING, INDICATOR, PARAMETER, PRECISION, ACCURACY, ASSUMPTIONS, SPACE, TIME, ENVIRONMENTAL MONITORING) (MP)

**MEASURES OF CENTRAL TENDENCY:** Measures of central tendency conceptualize the middle position of a data set or group of observations, and include the mean, median and mode. (See MEAN, MEDIAN, MODE) (MP)

**MEASURES OF DISPERSION:** Measures of dispersion indicate the spread or distribution of data, and include variance, standard deviation, standard error, range, interquartile range, skew and kurtosis. (See RANGE, VARIANCE, STANDARD DEVIATION, STANDARD ERROR, SKEW, KURTOSIS) (MP)

**MEDIA ACTIVISM:** See CULTURE JAMMING.

**MEDIA MANIPULATION:** See PROPAGANDA.

**MEDIA PIRACY:** Illegal or unauthorized use of copyrighted media content, software, brand-names, bandwidth or connection to internet, cable or satellite TV broadcasts. "Pirate radio" refers to stealthy broadcasting on illegal bandwidths of activist and alternative radio stations. Piracy refers more particularly to unauthorized "borrowing" of copyright media for cheap reproduction and sale, a practice widespread for example across Asia in print, CD, CD-ROM, VCD, and DVD formats. Media piracy reduces economic incentives and may drive official prices up. Nevertheless, it also equalizes the availability and distribution of information to the poor in developing countries who would otherwise not have access. (See ANTICOPYRIGHT, CULTURE JAMMING) (MP)

**MEDIAN:** 1. In statistics, the value falling in the middle of a data set when arranged in ranked order; the 50<sup>th</sup> percentile of the measurements. If the set contains an even number, the average of the two middle measurements is taken. The median is more robust than the mean, i.e not as sensitive to unusual data points such as outliers. (See MEAN, MODE) 2. In anatomy and biology, situated in the middle - for example the median artery or nerve. (MP, JA)

**MEDIATION:** Mediation of conflict in personal, industrial or international relations refers to the involvement or intervention of a third party such as a mutually respected neutral analyst. Success or failure can depend on the belief systems of the mediator in relation to each side of the dispute. Effective communication is also essential to negotiate compromise or settlement. Best may be several independent mediators who are able to represent each side of the dispute with empathy, but are still friendly with each other. (See FACILITATION, NEGOTIATION, DISPUTE, CONFLICT RESOLUTION, CONSENSUS, COMPROMISE, PREVENTIVE DIPLOMACY, TEAMWORK, THIRD PARTY) (MP)

**MEDICAID:** A US funded form of public assistance sponsored jointly by the federal and state governments providing medical aid for those below a certain level of income. (See MEDICINE; MEDICAL CARE). (IP)

**MEDICAL CARE:** The provision of expenses for doctors, nurses and other medical services as well as surgery, hospitals, institutional care and transportation necessary in the prevention/alleviation or treatment of a physical or mental disability or illness. Medical expenses, including medicines, drugs and health insurance premiums of an individual and his or her dependents are allowed as an itemized deduction to the extent that such amounts exceed a certain percent of adjusted gross income. (See MEDICAID; MEDICINE). (IP)

**MEDICAL EDUCATION:** Specialist training in one or more branches of medicine, including instruction in biology, physics and chemistry. Medical education has developed very differently in different countries but is becoming more and more transdisciplinary taking in, for example, subjects such as bioscience and bioethics. (See EDUCATION, RELIGIOUS EDUCATION). (IP).

**MEDICAL ETHICS and MEDICAL ETHICISTS:** Medical ethics is the clinical branch of bioethics dealing with the ethics of physicians and surgeons. It is to be distinguished from NURSING ETHICS (q.v.), Physiotherapy Ethics, Pharmacist Ethics, etc. Medical ethics includes many subcategories. Internists and oncologists tend to take a major interest in questions of care and the discontinuation of care of terminal patients, truth-telling, and the like. Neonatologists deal with patients who are incapable of making informed decisions on their own, but whose parents or guardians cannot always be counted on to make the best decision for them. Psychiatrists and paediatricians have patients with varying and often-unclear degrees of ability to make informed choices. Gynaecologists have questions about abortion, in-vitro fertilisation, etc. Bioethicists can play different kinds of roles in medical ethics. Some people think that medical ethics is a branch of philosophy. There are ethicists, sometimes with education in philosophy, who serve on hospital ethics committees or who accompany physicians on rounds, participating in clinical decisions. But it can be debated whether an education in philosophy gives sufficient understanding of the clinical realities to make decisions about life and death. So others think that the people to make the clinical ethical decisions should be physicians and nurses, and that the role of philosophical bioethicists should be pedagogical, helping to educate physicians and nurses to think deeply when they approach clinical ethical questions.

It is doubtful whether one person alone should take life and death decisions, like DNR, even if that person is the most distinguished professor of medicine. Weighty decisions should be made together with the patient and family, whenever possible, and after consultation in the ward staff meeting, with other physicians, nurses and social workers. (FL)

**MEDICAL ETHICS COMMITTEES:** See IRBS, EC.

**MEDICAL ETIQUETTE:** Accepted forms of social behavior among physicians and other health professionals. (DM)

**MEDICAL INFORMATION DIRECTORIES:** The desire of the health profession to benefit humanity saw it pioneer free and open

distribution of medical journals on the internet. Medline ([www.medlineplus.gov](http://www.medlineplus.gov)) is a free archive of some 3500 medical journals selected by the U.S. National Library of Medicine. Numerous other periodicals, directories, medical forums and diagnostic tools exist such as Medscape, Medical Matrix, HealthAnswers, OnHealth and Virtual Hospital. (See BIOETHICS INFORMATION DIRECTORIES, ENVIRONMENTAL INFORMATION DIRECTORIES) (MP)

**MEDICAL WASTE:** Waste materials from a diagnosis process or treatment of patient e.g. intravenous tubing, contaminated dressing materials. Synonymous names include hospital waste and infectious waste. Former includes all the discarded total waste both biological materials and non biological. Infectious while the latter refers to any hospital/ medical waste contaminated with germs of infectious diseases. (JA)

**MEDICINE:** (Latin *medicina* 'art of healing') the science and art of dealing with the prevention, cure and alleviation of disease. In its more recent sense the science and art of preserving good physical and psychological health. (See HIPPOCRATIC OATH, MEDICAL CARE; MEDICAID). (IP)

**MEDITATION:** See TRANSCENDENTAL MEDITATION, ZEN.

**MEDLINE:** See MEDICAL INFORMATION DIRECTORIES.

**MEGA-** : Standard SI Unit multiplier denoting one million times, or ten to the power of six (mega:  $10^6$ ). The mega- spatial scale deals with the international and global environment. (See SCALE, MACRO-, MICRO-, META-, TRANS-, INTER-) (MP)

**MEGADIVERSITY:** A concept introduced by Dr. McNeely to indicate the richness of species diversity in a given country by taking an inventory of species - 70% of worlds' species diversity is found in 10 such countries - Mexico. Columbia, Equador, Peru, Brazil, Zaire, Madagascar, china, India, Malaysia, Indonesia and Australia. (JA)

**MEGAFAUNA EXTINCTIONS:** See EXTINCTION.

**MEGALOMANIA:** Delusions of grandeur or personal importance, or a personality typified by lust for wealth and power. Megalomania may be a symptom of drug delusion, mania or psychosis. (See DELUSION) (MP)

**MEGALOPOLIS:** After the Ancient Greek Megalopolis of Arcadia, a mega-city; an extensive system of urban centers and interconnecting metropolis, typically with a population in the tens of millions. (See METROPOLIS, ECUMENOPOLIS) (MP)

**MEIOSIS:** The process of two consecutive cell divisions in the diploid progenitors of sex cells. Meiosis results in four rather than two daughter cells, each with a haploid set of chromosomes.

**MEME:** The word *meme* was first proposed by Richard Dawkins in the context of evolutionary processes and cultural replication, in *The Selfish Gene* (1976): "We need a name for the new replicator, a noun that conveys the idea of a unit of cultural transmission, or a unit of *imitation* . 'Mimeme' comes from a suitable Greek root, but I want a monosyllable that sounds a bit like 'gene'. I hope my classicist friends will forgive me if I abbreviate mimeme to *meme* . If it is any consolation, it could alternately be thought of as being related to 'memory', or the

French word *même* .” les, although not necessarily direct perception or things that cannot replicate or be imitated. Perhaps the best example of how memes compete and reproduce by natural selection is the ‘meme’ meme itself. The concept of the *meme* has successfully made it into dictionaries and general discourse, presumably helped by being analogous to the word *gene* . In contrast, another term for almost the same concept, the ‘culturgen’, proposeTOR) (MP & IP)

**MEME COMPLEX:** The ‘coadapted meme complex’, abbreviated to ‘memeplex’, is a group of memes which are symbiotic in that they are selected for, replicate and evolve together. Dawkins uses the ‘God’ meme complex as an example, suggesting we “regard an organized church, with its architecture, rituals, laws, music, art, and written tradition, as a co-adapted stable set of mutually-assisting memes.” (See MEME) (MP)

**MEMEPLEX:** See MEME COMPLEX

**MEME POOL:** See COLLECTIVE MEMORY.

**MEMETICS:** The scientific study of memes; their nature, replication, cultural transmission, storage media, technological links, genetic analogues, corresponding physiology, cooperation, competition, copying fidelity, fecundity and longevity. (See MEME, MEME COMPLEX, MEMOTYPE, SEMIOTICS, CULTURAL EVOLUTION) (MP)

**MEMORY:** (Latin: *memoria* ) 1. The capacity of the mind for learning, retention and recall of thoughts, observations and information. Memory is involved in the selection of events relevant to survival from a constant barrage of environmental inputs. Stimulus during certain critical stages of child development is crucial to memory and learning. There are different types of memory associated with different parts of the brain and having specific characteristics (e.g. visual association, language, short term & long term memories). Memory is associated with changes in the processing and neural channels of the brain rather than the molecules. Neurological details remain unknown, but memories are expressed as changes in the synapses and/or as broader interrelated patterns of excitation. (See COLLECTIVE MEMORY, MEME, MEMORY ENHANCEMENT, MEMORY IMPAIRMENT, MIND). 2. The storage capacity of a computer system, measured in bytes, or units of information, available for central processing, with hard drive storage commonly in the gigabyte range and random access memory in the megabyte range. (See ARTIFICIAL INTELLIGENCE) (MP)

**MEMORY ENHANCEMENT:** Capacity for memory is not necessarily predetermined and can be considerably enhanced with training and mental organization. The effort of memorizing must be made at the initial time of the observation rather than later at the time of recall. The metaphor of a filing cabinet is useful as it illustrates the importance of proper organization of memories in logically related groups. For long-term memory revision is important to reinforce the associated neural connections. Because memories predominantly rely on visual representations, many memory enhancement techniques use pictures and spatial relationships. Mind-maps are a useful tool for representing relationships between memory groups. Mnemonics associate initial letters or other markers with easy-to-remember phrases and are useful for memorizing lists or equations. Daisy-chaining also uses mental visual associations (most memorable if seemingly ridiculous) to link together related information such as the segments of a seminar. There are numerous other techniques involving visual associations and mental codes for

remembering facts, lists, faces, names and numbers. (See MEMORY, MEMORY IMPAIRMENT) (MP)

**MEMORY IMPAIRMENT:** The condition in which an individual experiences the inability to remember or recall pieces of information or behavioural skills, such as losing memory of earlier periods of life or forgetting to perform a behavior at a scheduled time. Memory impairment may be a symptom of drug intoxication, severe emotional trauma, brain damage, Alzheimers disease and senile dementia. The condition can be pathophysiological or environmental, and may be either temporary or permanent. (See AMNESIA, MEMORY, MEMORY ENHANCEMENT) (MP)

**MEMOTYPE:** As yet, 'memotype' is poor equivalent of phenotype). Grant (1990) defines the memetic information as the 'memotype', and its expression in social behavior the 'sociotype'. The distinction between the *meme* (or idea, instruction, 'i-culture', 'memotype') and the *meme phenotype* (or 'phemotype', 'meme product', 'vehicle', 'm-culture', 'sociotype') has varied between different investigators. Copying fidelity is not as good for 'copy the product' (e.g. Lamarckian inheritance) as for 'copy the instructions' (e.g. genetic inheritance), although both mechanisms are used by memes. (See MEME, MEMETICS, MEME COMPLEX) (MP)

**MENDEL, GREGOR:** Mendel, Johann - Given the name Gregor when he took the monastic vows in 1843. The so-called father of modern genetics for his experiments in the 19th Century on genetic segregation in peas. (DM)

**MENDELIAN DISORDERS:** In the pattern of inheritance there is a definite pattern of gene distribution where lateration of a single gene may lead to disorder with possible risk to relatives. A dominant gene inheritance with a 50% genetic risk to offspring of an affected person, is a frequent inheritance pattern in this group. The occurrence of new genetic mutations means that a significant proportion of such individuals may not have a family history of the condition, though their offspring will still be at high risk. E.g. Polycystic kidney disease. There could be late onset disorders following "recessive" inheritance E.g. haemochromatosis. (JA)

**MENDELIAN GENETICS:** Classical method of observing inheritance of a trait(s) in the offspring of crosses between individuals differing in that trait(s); results in accordance with Mendel's laws. (DM)

**MENGELE, JOSEPH:** (1911-1979) Known as the "Angel of Death". Mengele served as physician at the concentration camp at Auschwitz, and it was there that he conducted many horrifying experiments on living human beings. At the time of his enrollment at Munich University, the Nazi party already had a large presence in the German parliament. Mengele submitted his application to the Nazi party in 1937, after having absorbed an ideology of euthanasia and "purification" of race. He was admitted to the SS in 1938, after having been cleared of any suspicion of having Jewish ancestry, and received his medical degree the same year. He served as doctor of Auschwitz from May 1943 to January of 1945. His deepest obsession in his experimentation was with twins, because he was convinced that they held the key to genetic secrets. For this reason, he sought out Jewish twins in the camp for his experiments. The experiments themselves involved exposing the human body to extreme cold, high pressure, low pressure, etc., and he even injected dye into eyes to check the possibility of changing eye color in this manner. In addition to his general contempt for the subjects of his experiments, he deliberately chose Jewish holidays as dates of selecting his victims. When the Russian troops began to near the camp in January of 1945, Mengele fled. He was captured by the Americans and concealed his SS past. He managed to escape because he had switched his identity papers with his friend, Fritz Ulmann. Mengele fled Europe for Argentina, and later moved to Paraguay. In 1979, Mengele drowned. In 1985, his bones were exhumed. These were examined and proven to be

his remains. (AG)

**MEN'S BUSINESS:** 1. Australian colloquialism used by members of "men's liberation movement" 2. Australian Aboriginal tenning of life as an adult and establishes a young man's responsibility to their family and group while also learning about men's spiritual secrets and matters of law. Some parts of the ceremonies canitiates are marked by a permanent sign on the body to demonstrate that thto gradually learn about the land, its sacred sites and other matters. Men's business can be seen as the Aboriginal equivalent of Latin terms *Mens legis* - the mind of the law; that is, the purpose, spirit, or intention of a law or the law generally, and *Mens legislatoris* - the intention of the law-maker. (See WOMEN'S BUSINESS, TOTEMISM). (IP)

**MENTAL COMPETENCE OR CAPACITY:** The ability to understand the nature and effects of the act in which a person is engaging; such as the transaction of a particular contract or will or giving permission for the performance of a particular test or medical procedure. (See INFORMED CONSENT; MENTAL INCOMPETENCE). (IP)

**MENTAL HEALTH:** Since the founding of the United Nations the concepts of mental health and hygiene have achieved international acceptance. As defined in the 1946 constitution of the WHO, "health is a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity." The term mental health represents a variety of aspirations: rehabilitation of the mentally disturbed, prevention of mentate of well-being in which the individual functions at a level consistent with his or her mental potential. The concept of possible state insofar as circumstances are alterable. Mental health is regarded as a condition of the individual, relatiygiene includes all measures taken to promote and to preserve mental health. Community mental health refers to the extent onductive to, the mental health of its members. (DM)

**MENTAL ILLNESS:** Throughout history the mentally ill or disturbed have been viewed with a mixture of fear and revulsion. Their fate generally has been one of rejection, neglect, and ill treatment. Though in ancient medical writings there are references to mental disturbance that display views very similar to modern humane attitudes, interspersed in the same literature are instances of socially sanctioned cruelty based upon the belief that mental disorders have origins such as possession by demons. (DM)

**MENTAL INCOMPETENCE:** Is established when there exists an essential deficiency of the faculties of reasoning, or when a person is incapable of understanding and acting with informed choice in the ordinary affairs of life. (See INFORMED CONSENT, MENTAL COMPETENCE OR CAPACITY). (IP)

**MENTALLY RETARDED:** See MENTALLY DISABLED.

**MERCENARY ARMIES:** See INSTITUTION OF WAR.

**MERISTEM:** Embryonic tissue found on stem and root apex with totipotent property for lifetime growth, three types: 1. Protoderm-outer most protoderm which forms epidermis (epidermal tissue) 2. Ground meristem gives rise to ground tissue, 3.procambium forms vascular tissue. Apical meristem is infection \*(virus) free. Daughter plants derived from them also virus free. An example of micro-propagation. (JA)

**MESCALINE:** A spychoactive poisonous alkaloid derived from the flowering heads of *Lophophora williamsii* or peyote - the spineless cactus that grows in Mexico and the southwestern United States (made famous by Aldous Huxley in his book *The Doors of Perception* ). The drug produces visual hallucinations and can change an individual's perception of the world by stimulating grand illusions and exalted fecific



religious ceremonies to produce awe, euphoria and a feeling of es that balance mood (see BRAIN NEUROTRANSMITTERS; HALLUCINATION; PSILOCYBIN). (IP)

**MESOLITHIC AGE:** The archeological age beginning about 15,000 years ago characterized by pastoralism or the raising of domestic animals. (IP)

**MESOMORPH:** A person with a body shape (somatotype) typified by muscular frame, large bones and athletic features, who may find it genetically easier to develop muscle and maintain fitness. (See ENDOMORPH, ECTOMORPH) (MP)

**MESOTHELIOMA:** See SILICOSIS.

**MESSANGER RNA, mRNA:** A class of RNA produced by transcribing the DNA sequence of a gene. The mRNA molecule carries messages specific to each of the 20 amino acids. Its role in protein synthesis is to transmit instructions from DNA sequences (in the nucleus of the cell) to the ribosomes (in the cytoplasm of the cell). (DM)

**MESTIZO:** (Spanish: 'mixed') American-Spanish term (e.g. Mexico) referring to a person of mixed European and First Nation (American Indian) descent. (MP)

**META-** Combining prefix from the Greek: *meta-* means 'above' or 'outside'. (See TRANS-, MULTI-, MACRO-, MICRO-, MEGA-, INTER-, INTRA-, ANTI-, MAL-, PSEUDO-). (MP)

**META-ANALYSIS:** Investigation of a problem from 'above', whareviews a large multidisciplinary range of studies. (See ANALYSIS) (MP)

**METABOLISM:** See HALF-LIFE.

**METAETHICS:** See ETHICS.

**META-KNOWLEDGE:** Knowledge about knowledge, for example ways of knowing, knowledge categories, significance of knowledge, links and interactions, knowledge applications, and understanding of uncertainties and ignorance. (See KNOWLEDGE) (MP)

**METAPHOR:** 'Metaphor' is a literary and thinking device used to compare something unknown with something known. 'Metonymy' is rheting, or sometimes misleading. Care not to be misled by over-assumption of additional characteristics which may not be present in both, or confusion of the metaphor for actuality (e.g. the 'Selfish Gene' metaphor). (See AMBIGUITY) (MP)

**METAPHYSICAL:** The principles underlying a particular subject or system of beliefs. (DM)

**METASTASIS:** (Greek *meta* 'change' + *stasis* 'standing'). The process by which malignant tumor cells are transported by the lymphatic and/or circulatory systems away from the primary tumor and implant in other nodes and organs of the body. The prospects of survival are significantly decreased after metastasis reinforcing the need for early tumor detection and treatment. (See CANCER). (IP+MP)

**METHADONE:** See METHADONE HYDROCHLORIDE.

**METHADONE HYDROCHLORIDE:** A synthetic narcotic belonging to the group of drugs known as opioids which are similar in chemical structure and action to morphine. Although its addictive qualities may make itself a drug of abuse, it has been successfully used in methadone programs as a substitute for the treatment of heroin and other opioids addictions. Its effect lasts much longer than heroin - a single dose is

effective for approximately 24-hours compared with heroin's couple of hours. In treatment programs, methadone is usually given out in syrup form and drunk with cordial or fruit juice. Pregnant women who are dependent on opiates are encouraged to enter a methadone program as early as possible into their pregnancy as it is believed to result in fewer complications than the use of other opiates, such as heroin. However recent evidence indicates that methadone may be as damaging to the fetus as heroin. A person can only become a client of methadone treatment after being assessed by a doctor who is an approved methadone prescriber. (See HEROIN, JUNKIE). (IP)

**METHYL ISOCYANATE (MIC):** It is a poisonous gas involved in the Bhopal poisonous gas accident in 1985. It interferes with the mitochondrial electron transport chain, blocks cytochrome oxidase, stops the production of ATP and finally leads to death. (See BHOPAL) (JA)

**METRIC UNITS:** A system of units based on the meter and the kilogram that used multiples and sub-multiples of 10. All scientific work is done using the metric system of units. (See SCALE, SI UNITS, IMPERIAL UNITS, KILO-, NANO-, MEASUREMENT) (IP)

**METROPOLIS:** A major urban area and its cityscape, with one or multiple central business districts, including connecting suburbs, settlements and supporting infrastructure, typically with a population of several million ranging from 50,000 to tens of millions. (See SUSTAINABLE CITY, URBAN SPRAWL, MEGALOPOLIS, ECUMENOPOLIS) (MP)

**MHC:** See MAJOR HISTOCOMPATIBILITY COMPLEX.

**MIC:** See METHYL ISOCYANATE.

**MICRO- :** Standard SI Unit multiplier denoting one millionth, or ten to the power of minus six (micro:  $10^{-6}$ ). This is the scale relevant to larger molecules, cells, unicellular organisms and microchip circuits. (See SCALE, NANO-, MEGA-, MACRO-, INTRA-) (MP)

**MICROBIAL ECOLOGY:** The study of the relationships among microorganisms and between microorganisms and their environment. Concerns of microbial ecologists include fluxes of biologically active substances (e.g., nutrients, metals, water pollution and toxic chemicals in the environment). (see BACTERIA; MICROORGANISMS). (IP+RW)

**MICROBOT:** (Microscopic + robot) Miniaturization of wireless, networked robotic technology at the millimeter or micro-scales, currently also known as 'motes'. (See MOTES) (MP)

**MICROCHIP:** A microchip is a tiny set of integrated circuits on a semiconductor base such as silicon, designed to perform a set of electronic tasks. A microprocessor is a microchip which contains the whole central processing unit of a computer. (See MICROCHIP IMPLANTS) (MP)

**MICROCHIP IMPLANTS:** Miniature electronic devices which are implantable under the skin of animals to perform functions such as cybernetic communication or micro-tag identification. Investigations are beginning in human subjects such as cybernetic self-experimenter Kevin Warwick, whose internet-enabled implant can do things such as send message signals to his nervous system or activate light switches on his approach. (See CYBORG, CYBERNETICS, TELEPATHY, PSYCHOKINESIS) (MP)

**MICROECONOMICS:** The branch of economics which investigates economic policy in terms of individual decision-making, for example supply and demand, competition, capital flows, government and corporate finance, and income distribution. (See MACROECONOMICS, ECONOMY) (MP)

**MICROCOSM:** See MICROECOSYSTEM.

**MICROECOSYSTEM:** A miniature system with living organisms like bacteria growing in a culture tube - a miniature man made ecosystem or biospheres, = microcosm with regulators for the control of inflow and out flow of nutrients. (JA)

**MICROHABITAT:** Specific localized conditions in which an organism lives, such as a certain type of soil. Microhabitats reflect the non-uniform nature of the environment and the availability of many ecological niches within any habitat. A diversity of microhabitats may be required for the co-existence of species competing for overlapping niches. (See HABITAT) (MP)

**MICROINJECTION:** A technique used for the insertion of genes from one cell into another cell, in which highly purified copies of a specific gene of interest are injected into a cell. Copies of one specific gene of interest can be injected into a fertilized animal egg. The egg is then surgically implanted in a female animal's reproductive tract. (see I.C.S.I). (DM)

**MICROORGANISMS:** Minute, microscopic, or submicroscopic living organisms (e.g. bacteria, mycoplasma, and viruses). (DM)

**MICROPROCESSOR:** See MICROCHIP.

**MICROPROPAGATION:** A form of plant breeding commonly called propagation, used in modern horticultural technology, using the regenerative powers of individual cells and tissues to produce numerous independent plants from a single parent plant. (JA)

**MICROSATELLITE:** Short repeated sequence made up of two to four nucleotides, present on average every 50kb (kilo base pair) in the genome. The most common (from 35.000 to 1500.000 in the whole genome) are clusters of di-nucleotide sequences (CA)<sub>n</sub> or (GT)<sub>n</sub>, where the number (n) of the CA/GT units at a given locus can vary from one individual to the other. Due to their repetitive structure, microsatellites undergo frequent slippage events during replication of DNA, giving rise to a high polymorphism of these sequences. This feature has made them very a useful tool in linkage analysis, population studies (phylogenetic and evolutionary studies) and forensic DNA analysis (see STR) (GK)

**MIDDLE WAY:** In Buddha's philosophy, his 'Middle Way' ( *Madhyamika* ) is a life which does not follow extremes of pleasure on the one hand, or extreme asceticism on the other. Buddha's Middle Way to enlightenment is a union of all reality, and involves moderation, contentment, compassion and follP)

**MIDRASH:** (from the Hebrew root d.r.sh., meaning "to seek", "to inquire") The word Midrash refers both to a method of allegorical interpretation of scripture and to a group of texts which interpret the Old Testament in allegorical manner. Two major types of Midrash collections are: Midrash Halacha (see Halacha) and Midrash Aggada. The Midrash Halacha collections deal with Halacha applications of the text. Midrash Aggada collections include a more extensive elaboration verse by verse, of allegorical interpretation of the Old Testament,

especially its narrative sections. In the Midrash collections, it is possible to find views of ancient Jewish sages on life, human society, interpersonal relations, human beings and the universe, creation, and many other topics. Due to the allegorical nature of Midrash, at times animals are portrayed as speaking, and through this it is possible to learn of attitudes of these ancient sages towards other species. (AG)

**MIGRATION CORRIDORS:** See HABITAT CORRIDORS.

**MILESTONE:** A significant event, indicator or mark in the passage of time and progress through life or human history. (MP)

**MILL, JOHN STUART:** (1808-1873) Mill followed Jeremy Bentham in developing UTILITARIANISM (Q.V.) as a philosophy of ethics. He also distinguished himself in ethics by his book, *On the Subjection of Women*, an important source in the women's rights movement. In pure philosophy, he wrote a book on logic in which he argued that mathematics is an empirical science like any other, simply describing facts in the world. This means that we know that 5 plus 7 equals twelve, because every time we have observed 5 things plus 7 things, we have found there to be 12 things. But if this is merely a statement of observation, it will not therefore follow that the next time we see 5 things plus 7 things, there will necessarily be twelve of them. The philosopher and mathematician, Gottlob Frege fiercely attacked Mill, arguing that unlike empirical observations, mathematics are necessarily, absolutely and eternally true. Frege and RUSSELL (q.v.) tried to develop axiom systems to prove mathematics as absolute truths. But since the completeness of axiom systems was questioned by Kurt Godel in 1931, it has become clear that we are still far from understanding the truth about this debate.(FL)

**MILTON, J:** (1608-1674) John Milton is best known for his religious poetic works like *Samson Agonistes*, *On his Blindness*, and *Paradise Lost*. In the latter work, there is the idea of the fallen angel, the daemon Satan, deceiving humans into doing unethical things. And in the philosophical works of his French contemporary, Rene Descartes, there is the idea of an evil daemon, deceiving people into intellectual error. So it must have been an age preoccupied for some reason with bad angels. Milton's greatest influence on the history of ethics, however, was through his many political pamphlets. He was on the side of Cromwell, the Protestant reformist revolutionary who defeated the Stuart monarchy and killed King Charles the First. Cromwell defended the regicide. But over the ensuing years, kings and politicians have succeeded in convincing people that although all murder is a sin against the sanctity of human life, the lives of kings and politicians are a little holier. In his pamphlet, *On the Tenure of Kings and Magistrates*, Milton argued, on the basis of Bible and philosophy, for the idea of a contractual relationship between a people and its ruler. This is a relationship in which the ruler gets all his or her authority from the consent of the people. And the people, as in the revolt of the Biblical Ten Tribes of Israel, have the right to break the contract whenever the ruler does not fulfil his or her obligations. This concept of a *social contract*, which was embodied in the American Declaration of Independence, is often credited to Thomas Hobbes, John Locke or Jean-Jacques Rousseau. Milton's original contributions to this basic idea of modern democracy is usually ignored. (FL)

**MINERAL AND VITAMIN DEFICIENCY:** Deficiencies may result due to an inability to use one or more of these elements essential in nutrition because of lack of that item in the diet, malabsorption or genetic defect. Deficiency symptoms vary according to the function of the substance in promoting growth and maintenance of health. Vitamin and mineral requirements are especially important in health care for infants, children, adolescents and the sick and elderly because the demand for these essentials is higher per unit of body weight compared with more stable times. (See NUTRITION, VITAMIN A, VITAMIN B complex, VITAMIN B, VITAMIN C, VITAMIN D, VITAMIN E,

VITAMIN K, MINERALS). (IP)

**MINERALS:** (Latin *minera* 'mine'). Inorganic substances with characteristic chemical compositions and structures - typically crystalline - occurring naturally in the earth's crust. Minerals are constituents of all body tissues and fluids, and they are essential in the maintenance of physiological processes acting as catalysts in nerve transmission, muscle contraction and metabolism of nutrients in foods. Our supply of minerals comes almost exclusively through the food chain. Plants take them from the ground and incorporate them into organic compounds that we consume by eating either plants or animals that ate the plants. The main exception is table salt (sodium chloride or NaCl) which provides sodium and chloride in inorganic form. The minerals calcium, magnesium, phosphorus, potassium, sodium, sulphure, copper, iodine, iron, manganese, cobalt, molybdenum, selenium and zinc are all essential in animal and, therefore, human nutrition. (See NUTRITION, BIOGEOCHEMICAL CYCLE, VITAMINS, MINERAL AND VITAMIN DEFICIENCY). (IP)

**MINISATELLITE:** Discovered by A. Jeffreys in 1985, these dispersed repetitive elements of the human genome have shown to be very polymorphic and were therefore introduced as the first tools for human identification purposes in forensic cases. They contain a short repeated element, whose core sequence is very similar to bacterial chi (□ ) sequences. (See also VNTR and FORENSIC DNA). (GK)

**MINORITY GROUPS:** Small groups within a population whose ethnicity, culture or religion are under-represented by a state's democratic processes, and who may be the subject of racism or human rights violations at the hands of systems reflective of the majority view and neglectful of the diversity. (See AFFIRMATIVE ACTION, ACTIVISM, EMPOWERMENT) (MP)

**MINORS:** Persons who have not attained the age at which full civil rights are accorded. (DM)

**MIRAGES:** Lie in the uncertain twilight zone between the real and the unreal. They are caused by refraction; that is, a change in direction of light rays when they move from one transparent medium to another of different density, such as from air to water or vice versa. Mirages are illusions because the observer's brain mistakenly thinks the light is traveling in a straight line so the observer sees real objects displaced from their true positions (see RAINBOW & HALOES). (IP)

**MIRV:** A Multiple Independently Targeted Re-entry Vehicle (MIRV) is a missile which carries a payload of multiple separate smaller missiles. Each sub-missile is a self-contained weapon, sometimes released along with decoys, and independently targeted at a range of military, transport and communications facilities. The MIRV developed from the Multiple Re-entry Vehicle (MRV), a missile which opened up to spray non-targeted extra missiles over a wider area to increase the chances of a strategic hit. (See MISSILES, ICBM, SLBM) (MP)

**MISCONDUCT:** Violation of laws, regulations, or professional standards. (See FRAUD, CONFLICT OF INTEREST, MALPRACTICE, MORAL COMPLICITY). (DM)

**MISHNA:** The Mishna is a Jewish holy book, next in authority after the Bible. It is believed that when God gave the Tora (the first five books of the Bible) to the Israeli people through Moshe, God gave it in two forms: written and oral. The oral Tora is the explanation of the written one. Moshe passed the explanation on to Yehoshua-ben-Nun (Joshua), from whom it was passed on from generation to generation, until the present day. This interesting story is told in the very readable Mishnaic *Treatise of the Fathers*, which has been translated into English and many other languages. The explanation was never written down until the time of the Roman occupation of the Land of Israel. But the Romans were making it very difficult for people to learn Tora, and it was in danger of being forgotten altogether. So Rabbi Yehuda-ha-Nasi broke the

tradition and wrote down what he had received of this tradition. The Mishna later became part of the TALMUD (q.v.) Probably the Mishnaic passage best known to bioethicists comes from the treatise *Ohalot*, in which clear permission is given to perform an abortion when the mother is in danger because, as the Mishna states: "her life comes before its life". This passage marks a clear distinction between Judaism and Christianity on the abortion issue. Subsequent discussion has centred on the question of how much danger the mother must be in before abortion is permitted. (FL)

**MISINFORMATION:** Making general claims on the basis of partial knowledge. (IP)

**MISOXENIA:** (from the Greek "mis-"= hate, "xene"= foreigner) Hatred of foreigners. The term xenophobia was clumsily applied to take this meaning. However, the term "xenophobia" is confusing, as its name indicates fear of foreigners, rather than hatred of them. While it is true that often feelings of fear may be accompanied by feelings of hate, the two are different emotions. Arachnophobia is fear of spiders, not hatred of spiders. Acrophobia is a fear of high places, not hatred of them. One who is acrophobic does not seek to destroy high places, but rather to avoid coming into contact with them. It is understandable how misoxenia can form, because in contact with outsiders, one easily forms stereotypes after meeting a few members of a group of outsiders. If the stereotype contains some negative aspects (and many stereotypes do), this plants the seeds of hatred, which can grow if encouraged by political speeches and demagoguery. It can also be encouraged by difficult economic conditions, when people are likely to search for simple reasons for economic troubles, and a foreign scapegoat is a common reason to be found. While fear of the foreigner can be overcome to some extent by positive contact with members of the foreign society, hatred of the foreigner is more difficult to overcome, especially when it has the cumulative effect of several generations. (AG)

**MISSILES:** Missiles include anything projected or fired at a target, such as arrows and bullets, with current usage commonly referring to rocket-propelled explosive weapons used in warfare. Explosive missiles include the grenade (hand-thrown bomb), mortar (portable ground-launched bomb), rocket launcher (portable or fixed), SAM (Surface-to-Air Missile), MRBM (Medium-Range Ballistic Missile), IRBM (Intermediate-Range Ballistic Missile), ICBM (Inter-Continental Ballistic Missile), SLBM (Submarine-Launched Ballistic Missile), MIRV (Multiple Independently-targeted Re-entry Vehicle), Cruise Missiles, Autonomous ('smart') Missiles, Nuclear Missiles and Antimissiles. The proliferation of missile technology and global unease about nuclear and biochemical weapons have contributed to the development of regional arms races and expensive new weapons in space proposed to protect allied countries from incoming ICBMs. The SALT (Strategic Arms Limitations Talks/Treaty), ABM (Anti-Ballistic Missile) and Non-Proliferation Treaties serve as imperfect examples of the international attempts required to regulate and reduce this explosive proliferation. (See ICBM, SLBM, MIRV, CONVENTIONAL WEAPONS, AUTONOMOUS WEAPONS, NUCLEAR WEAPONS, EXPLOSIVES, BALLISTICS, MISSILE DEFENSE) (MP)

**MISSILE DEFENSE:** The concept of a protective shield against nuclear or biochemical attack, in which incoming ICBMs are destroyed by land, ship or space-based defensive weapons. The first US initiative was the Zeus anti-missile missile, but Cold War paranoia during the Reagan administration sparked expensive and earnest attempts at missile defense, commonly dubbed the 'Star Wars' project. Despite the decline of the Soviet threat after the Cold War, the Bush Snr., Clinton and Bush Jr. administrations have revived the concept with projects known as the 'Strategic Defense Initiative' or 'National Missile Defense'. Tests have been carried out to determine the effectiveness of "hit to kill" technology in which the kill vehicle intercepts and destroys incoming missiles in the upper atmosphere. These 'simplified' tests havegets. In addition, the initiative would have no effect against typical terrorist tactics, for example a 'suitcase bomb'. Nevertheless likelihood as the

development of multiple nuclear ‘bomblets’, and act as a cover for the development of offensive weapons in space. (See SPACE WARFARE, ICBM, NUCLEAR WEAPONS, NUCLEAR NON-PROLIFERATION, HARD POWER) (MP)

**MISTAKE:** (Old Norse: *mistaka* ) An accidental wrong action or judgment having negative repercussions despite no original intention of harm. Although genuine mistakes should be forgivable, the issues of negligence and reparation may arise. Having to learn from your own mistakes is not as wise as learning from the mistakes of others. (MP)

**MISTRESS:** 1. a woman who has the power of controlling or disposing of authority; for example, head of household or authority over servants. 2. a woman who has a continuing sexual relationship with one man outside marriage (see COURTESAN). (IP)

**MITOCHONDRIAL DNA:** Circular DNA molecule embedded in the matrix of the mitochondrion. Its size in mammals is around 16kb, whereas in *S. cerevisiae* it is 84kb. The mtDNA molecule in humans is 16.569 base pairs long. One of the differences between both molecules is that the human mitochondrial genes do not possess introns, whereas two genes in the yeast have large introns (Cytb and CO1). There is also a considerable amount of yeast mtDNA that seems to be non-coding (25% stretches rich in AT). In humans, the two strands (H and L) differ in nucleotide content, the H (heavy) strand comprising mainly G and T residues (□ 61%), whereas the L (light) strand contains mainly A and C bases. Mitoch; therefore, mtDNA does not show recombination. Since there are multiple same cell; these can be transmitted in a random way to the daughter cells. This phenomenon is called heteroplasmy. Mice show some degree of paternal transmission of mtDNA. (GK)

**MITOCHONDRIAL DISEASES:** Comprises a heterogeneous group of diseases affecting muscle and nervous system cells (see mitochondrial myopathies), as well as multiple internal organs. Therefore, these diseases have also been named mitochondrial cytopathies. They are characterized by enzymatic deficiencies of the respiratory chain, often accompanied by aberrant mitochondria, and abnormalities of the mitochondrial or nuclear genes encoding several proteins of the mitochondrial respiratory metabolism. mtDNA abnormalities consist of point mutations at particular positions, or deletions of varied locations and length. Multiple deletions have been sometimes found in a same patient. In some cases, other members of the family (i.e. the mother and sibs) may exhibit mtDNA deletions with varied degrees of clinical compromise, due to a threshold effect of the number of normal versus truncated mtDNA molecules, making genetic counselling a difficult issue. (GK)

**MITOCHONDRIAL MYOPATHIES:** Group of muscular diseases showing mtDNA abnormalities (see mitochondrial diseases). The name was coined in 1962 in the case of a patient whose muscle cells showed abnormal fibres under the microscope, termed ragged red fibres (RRF). Point mutations are responsible for MELAS, MERRF, NARP, Leber Optic Atrophy and Leigh syndrome, whereas External Ophthalmoplegia, Kearns-Sayre Syndrome and Pearson Syndrome are due to deletions ranging from 1.3-8kb. Mutations in nuclear genes have also been found in patients where an autosomal dominant mode of inheritance is evident. (GK)

**MITOSIS:** A type of cell division that produces daughter cells that typically have the same number of chromosomes as the originating cells. (DM)

**MNEMONICS:** See MEMORY ENHANCEMENT.

**MO TZU:** Mo Tzu lived in 6th century B.C. China , and had an opposing view to Confucius who believed that people should love their family first and other persons to lesser degrees. Mo Tzu believed that human love should be modeled on the will of Heaven which he argued loves

everyone equally. Love should be extended to all persons everywhere without distinction, and condemned the ethic of family loyalty blaming it as a cause for social conflict and warfare. He wrote Familial love "should be replaced by the way of universal love and mutual benefit...It is to regard other people's countries as one's own. Regard other people's families as one's own. Regard other people's person as one's own. Consequence they will not neglect each other, the poor, the hoe prevented from filial piety, family love, implies, he believed that limits on caring only for one's own had to be strictly enforced when it ceased to be beneficial for all. (DM)

**MODE:** (Latin: *modus* "measure" or "manner") 1. In statistics, the value in a data set which occurs with the greatest frequency. In a bimodal distribution, it may be more relevant to report two modes, rather than the mean or median which may lie between the peaks and be less likely to occur. (See MEAN, MEDIAN) 2. The manner in which things are done, as in the prevailing fashion or mode of operation. (MP, JA)

**MODEL:** A simplified representation of a system or the surrounding environment. Models are created from the following procedures: search for meaningful patterns and processes, selection of basic structures with stable form, establishment of function and connection, simplification to a manageable level of complexity, and transformation into a well defined set of information. As fundamental examples, scientific knowledge is based on mathematical models, words and definitions are models of reality transferred into language, and a paradigm is a conceptual model of the world. On paper, a model is like an architect's blueprint or electrician's diagram - a graphical representation of inputs/outputs, reservoir. (See MODELING, MEASUREMENT, INDICATOR, STATISTIC, CENSUS, SCIENTIFIC METHOD, SYSTEM, COMPLEXITY, EXPERT SYSTEM) (MP)

**MODELING:** There are many ways to categorize the numerous types and methods of modeling (UK/Australian spelling: 'modelling'). One of the most useful ways of classifying models is by function or purpose:

*Descriptive modeling* measures and describes environmental states and structures at different scales (e.g. Definitions of words, Language, Mapping, Blueprints, Simulation Models, Descriptive Statistics, Systems Analysis, Systems Theory, Network Diagrams, Hierarchical Analysis, Geographical Information Systems, State of the Environment Reports etc).

*Explanatory modeling* determines the processes and flows (matter, energy, money) contributing to a problem and how can they be directed towards the objectives; to determine interactivity within the model, causes and effects, and tendencies for change. (e.g. Network Flowcharts, Process Modeling, Causal Modeling, Statistical Inference, Feedback Circuits, Cybernetics, Material Flux Analysis, Life Cycle Assessment etc).

*Predictive modeling* attempts to assess and predict the potential impacts of the options and preferred impacts/outcomes of the objectives (e.g. Risk Analysis, Cost/Benefit Analysis, Hypothesis Testing, Probability Analysis, Game Theory, Pressure/State/Response Model, Environmental Impact Assessment, Social Impact Assessment etc).

*Prescriptive modeling* defines and recommends policy or procedural conditions for the preferred outcomes, such as sustainable management procedures (e.g. Laws, Policy objectives, Strategic Environmental Assessment, Decision Support Systems, Expert Systems etc).

*Evaluative modeling* to test the model and monitor environmental changes (e.g. Monitoring, Indicators, Before/After Control/Impact Study, Sensitivity Analysis etc). (See MODEL, SYSTEMS THEORY, COMPLEXITY THEORY, ENVIRONMENTAL PROCESSES, STATISTICS, UNCERTAINTY, NETWORK, FEEDBACK, CYBERNETICS, BOOLEAN LOGIC, FUZZY LOGIC, GAME THEORY, SENSITIVITY



ANALYSIS, GEOGRAPHICAL INFORMATION SYSTEMS, PRESSURE/STATE/RESPONSE MODEL, ENVIRONMENTAL IMPACT ASSESSMENT, RISK ASSESSMENT, LIFE CYCLE ASSESSMENT, STRATEGIC ENVIRONMENTAL ASSESSMENT, COMPUTER MODELING) (MP)

**MODERNIZATION:** In the past modernization has typically been seen as including aspects of growth, urbanization, industrialization, commercialization, capitalism, democracy, globalization, secularism, postmodern relativity, individualism and technological determinism. But modernization encapsulates that which is new, and now the meaning itself is modernizing with spreading realization of the limits to industrial development on Earth. In this century, modernization will indicate progress in sustainable development, science-based management, green technology, resource & energy efficiency, access to information & technologies, conflict resolution, tolerant pluralism, and increased health, literacy, wellbeing, leisure and ethics. (See GLOBALIZATION, WESTERNIZATION, DEVELOPMENT, PROGRESS, TECHNOLOGY) (MP)

**MOLECULAR ASSEMBLER:** See ASSEMBLER.

**MOLECULAR COMPUTER:** A potential future technology proposed by the science of molecular electronics. The molecular computer would be an extremely small, powerful, dense, heat-efficient computational device made up of various components of differing electrical properties being developed by the field. The molecular computer would largely be made up of carbon-based molecules - *organic* chemistry such as that of life. Molecular arrangements of DNA information storage mechanisms have been a source of inspiration, implying that the physics can be made to work if we could more efficiently manipulate the components. Separate concurrent lines of research are also developing and refining quantum computers and DNA computers. (See MOLECULAR ELECTRONICS, DNA COMPUTER, QUANTUM COMPUTING, NEURAL COMPUTING) (MP)

**MOLECULAR ELECTRONICS:** The science of arranging molecules to act as electronic circuits. Various arrangements of organic molecules have been manipulated to act like logic gates, switches, diodes, resistors, wires, and potentially also transistors. The supporting infrastructure of possible future molecular computers may include spherical (e.g. buckminsterfullerene), wire-like (e.g. special carbon-chains) and tubular (e.g. carbon nanotubes) organic molecules which have been developed and investigated for their electrical properties. Hexagonal carbon nanotubes conduct electricity when arranged in a straight line, and are an effective semi-conductor when arranged as a helix. The electrical properties of carbon in this form have aroused interest in computer researchers who foresee bottlenecks in the miniaturization of silicon devices. Molecular electronics probably holds many of the keys to artificial life, artificial intelligence and nanotechnology, and as such also opens up a new paradigm of technological possibility and ethical concern. (See MOLECULAR COMPUTER, QUANTUM COMPUTING, ASSEMBLER, NANOTECHNOLOGY WEAPONS, ARTIFICIAL LIFE, NEURAL NETWORKS, FULLERENES, BUCKMINSTERFULLERENE) (MP)

**MOLECULAR NANOTECHNOLOGY:** See NANOTECHNOLOGY.

**MOLLUSCA:** One of the oldest phyla of complex invertebrates; all major lines were already established during the Cambrian period. This phylum is characterized by a thick, muscular body wall; a muscular foot, generally used for locomotion; and several other characteristics that are usually, but not always present: non-segmented, the body secretes a shell that encloses a mantle cavity, a regionalized digestive tract, and a

well developed circulatory system. Extant classes include the Polyplacophora, Gastropoda (snails), Bivalvia (bivalves), Cephalopoda (squids and octopuses). (RW)

**MOMENTUM:** The mass times the velocity of a moving object gives its momentum (p) in kilogram meters per second (kg.m/s). The more momentum, the more damage it can do and harder it is to stop. Change in momentum is called 'impulse'. (See ENERGY, FORCE, WORK). (MP)

**MONERA:** One of the five taxonomic kingdoms (along with Animalia, Plantae, Fungi and Protista), the Monera include the Archaeobacteria and Eubacteria including Cyanobacteria. The monera lack a membrane-enclosed nucleus. (See BACTERIA) (MP)

**MONGOLISM:** A common congenital malformation, with mongoloid eye folds. This term has now been replaced by Down's syndrome. (See DOWN SYNDROME). (JA)

**MONOCLONAL ANTIBODIES:** Identical antibodies that recognize a single specific antigen and are produced by a clone of specialized cells. (DM)

**MONOAMINE OXIDASE:** A neurotransmitter which metabolizes adrenaline, the hormone that enables the body to meet a threat by either running away, standing ones ground or fighting - also called the flight/fight response. (IP)

**MONOAMINE OXIDASE INHIBITORS:** See ANTIDEPRESSANT DRUGS.

**MONOCULTURE:** The agricultural production of a single crop type, consisting of large tracts of land containing virtually only one species. Such a landscape is far removed from resembling natural habitat, and may be considered almost ecologically inert. This conventional style of agriculture "mines the land" of its fertility and ecology and is an underestimated environmental concern. To increase biodiversity across these extensive areas, monocultures should be replaced with polycultures and permaculture practices such as agroforestry. (See POLYCULTURE, PERMACULTURE). (MP)

**MONOECIOUS:** (Greek: *mon* 'single' + *oikion* 'house') Hermaphroditic organisms which produce both male and female gametes in the same individual; for example some plants like maize or animals like earthworms (Greek *mon* single *oikion* house) (see DIOECIOUS). (IP)

**MONOGENIC DISORDER:** Genes are involved in genetic disorders in human beings. If disorders are traced to a single gene then such disorders are called monogenic disorders e.g. sickle cell anemia, cystic fibrosis and muscular dystrophy. (JA)

**MONOSOMY.** One chromosome or a portion (partial monosomy) of it is missing. Monosomies lead to very severe phenotypes and do not survive to birth; therefore, the only one that is viable is Turner syndrome (XO monosomy). Somatic monosomy is sometimes observed in cancer tissues, leading to a hemizygotic genotype for a mutated oncogene. (GK)

**MONOTHEISM:** The doctrine or belief that there is only one God, the oneness of God, common to Judaism, Christianity and Islam. The first act that one does to embark on Islam is the deceleration of faith which means ,reiterates the necessity of the belief in the oneness of Allah (see ALLAH). (AB)

**MONTANE:** (Latin: *montanus* 'mountain') Existing on or pertaining to mountains or the mountain environment, especially the communities below the 'tree line', above which are snow-covered alpine altitudes. Many montane environments may qualify as 'ecological hot-spots'

because mountains act to isolate ecosystems into biogeographically distinct evolutionary 'islands'. (See ECOLOGICAL HOT SPOTS) (MP)

**MONTREAL PROTOCOL:** International successes towards the phasing out of CFCs as a result of the Montreal Protocol on Substances that Deplete the Ozone Layer (1987) and its revisions (London 1990, Copenhagen 1992) are a potential model for dealing with other environmentally harmful chemicals. (See KYOTO PROTOCOL, OZONE HOLE) (MP)

**MONOTREMES:** See MARSUPIALS, EUTHERIAN MAMMALS.

**MOOD:** Mood is the balanced and consistent extension of emotion over time. For example, happiness is the mood resulting from consistent extension of the pleasure/joy emotion. Similarly, the mood disorder of depression is extension of sad emotions over a long time period. (See EMOTION, HAPPINESS, DEPRESSION, ANXIETY) (IP & MP)

**MOORE, GE:** (1873-1958) George Edward Moore was a colleague of BERTRAND RUSSELL (q.v.) at Cambridge. He opposed the idealist philosophies, which said that only our thoughts and sense experience exist, and that the world of material objects, time and space, are not real. He therefore developed a "philosophy of common sense", and thought that he could prove that material objects exist by holding up a hand and saying, "this is a hand". Those who would like to reply to Moore by saying that they do not see a hand but only sense experiences in their brains or souls, are dismissed as being in disagreement with "common sense". The later Ordinary Language Philosophy movement, which held that the way educated Englishmen, especially Oxonians, usually speak, has got to be right, was really a development of Moore's philosophy. In his influential book on ethics, *Principia Ethica*, Moore taught the doctrine of "Intuitionism", according to which "good" is a simple, intuitable quality like the colour yellow. Being simple, the quality of goodness cannot be defined, any more than can the quality of being yellow be defined. Just as we immediately see that something is yellow, so we can immediately see that something is good. It has been debated whether Moore's intuitionism can explain how some things may appear good to some people or societies, and bad to others. (FL)

**MOOT:** As in "a moot point" - a discourse of legislators on a point of law. (IP)

**MORAL:** 1. of or concerned with the judgment of the goodness or badness of human actions and character; that is, pertaining to the discernment of good and evil 2. the lesson or principle contained in or taught by a fable, story, or event 3. rules or habits of conduct, especially sexual, with reference to standards of right and wrong (see MORAL PHILOSOPHY, contrast with ETHICS). (IP)

**MORAL COMPLICITY:** Association with or participation in an act that is, or is perceived to be, immoral. (See CONSCIENCE, MISCONDUCT). (DM)

**MORAL DEVELOPMENT:** The process by which individuals internalize standards of right and wrong conduct (DM)

**MORAL PHILOSOPHY:** Designed to teach goodness or correctness of character and behavior; that is, instructive of what is good and bad according to an established code of behavior. (IP)

**MORALITY:** Generally accepted standards of right and wrong conduct. (DM)

**MORBIDITY:** An index in reproductive status of a population. Indicates the state of illness or sickness. The concept of "good health" changes from a culture to culture and its meaning changes over space and time. Definitions vary among researchers since it is highly subjective and

based on perception and reporting of the state of illness. It measures the proportion of the total population who regard themselves as having become sick or diagnosed as sick, it deals with the prevalence and incidence of the sick in a population. (JA)

**MORPHIC RESONANCE:** A controversial but testable theory of morphogenesis, developed by Rupert Sheldrake based on the concept of morphogenetic fields. The easy emergence of form which already exists, contrasted with the difficult emergence of new form (e.g. a new idea, new chemical), is explained by the morphic resonance of the existing form. (See MORPHOGENESIS, TELEPATHY, HOLOGRAPHIC UNIVERSE THEORY) (MP)

**MORPHINE:** (Greek *Morpheus* 'god of sleep'). ( $C_{17}H_{19}NO_3$ ). The principal alkaloid of opium contained in the dried juice of the heads of the oriental (white) poppy *Papaver somniferum*. Morphine acts on the central nervous system to produce both analgesia and euphoria but is also a depressant, particularly of the respiratory system. Morphine was isolated in 1803 by Sert\_erner who, owing to its sedative properties, named it Morpheus after the God of Sleep. It is a most useful narcotic analgesic with powerful sedative properties making the drug apt for clinical use in the relief of persistent visceral pain, especially that associated with incurable diseases. It has also been used for serious anxiety states, as a pre-medication drug before surgery, and to produce euphoria in the dying. However, morphine is a strong addictive drug with severe withdrawal symptoms; therefore, addicted individuals are often transferred to methadone, which has less severe withdrawal symptoms. (See HEROIN, ADDICTION). (IP)

**MORPHOGENESIS:** The development of distinctive shape and form, for example cell differentiation into organ systems, stages of embryonic development, and growth of organisms. (MP)

**MORTALITY:** The number of deaths in a given population during a given period of time or from a particular cause. (DM)

**MORES:** The accepted traditions, customs or code of behavior of a particular social group that is regarded to be an essential to its survival and welfare. (IP)

**MORULA:** (the Latin for mulberry) once the proliferating cells from the fertilized egg compact, they appear at the 12-16 cell stage like a mulberry. Hence the name is applied to the embryo about three days after fertilization. (DM) Since cells at this stage are still totipotent, the morula can be separated in two and give rise to monozygotic twins. They will be genetically identical, although epigenetic factors and *de novo* mutations may alter their phenotype. Morulas are used for pre-implantation screening during IVF processes: a blastomere is separated from the whole morula and used for genetic testing, without apparently affecting the subsequent development of the embryo. In particular cases, ethical issues relating to the possibility of mosaicism or chimerism of the blastomeres must be taken into account. (See IVF) (GK+DM)

**MOSAICISM:** It is of two kinds, somatic and germinal. Refers to the presence of cells with different genetic constitution in the same organism, such as genetic mutation in cancer cells that is not shared by other normal cells. It is a somatic mosaic condition. In germinal mosaicism there is autosomal dominant inheritance. (JA)

**MOTES:** Motes are the individual microchips or microprocessor units of sensor networks and ‘smart dust’. Spread a group they can have ‘swarm intelligence’, or wireless netwking, swimming, snOT, NANOBOT, ASSEMBLER, SWARM INTELLIGENCE) (MP)

**MOTIVATION:** See PROFIT MOTIVE, VESTED INTERESTS.

**MOTHER FETUS RELATIONSHIP:** The relationship between the fetus or embryo and the mother in which the embryo is gestating. (DM)

**MOUNTAIN ENVIRONMENT:** See MONTANE

**MOXIBUSTION:** Method of treatment involving the burning of moxa cones on the skin. Moxa is a plant substance, and this method is used in traditional Chinese medicine and related practices. (AG)

**MRC:** The Medical Research Council, for example of the United Kingdom.

**MREC:** Multi-centre Research Ethics Committee, United Kingdom.

**MRI:** short for magnetic resonance imaging. The procedure involves initiating a nuclear magnetic resonance in the body’s hydrogen atoms by passing a restricted amount of high-frequency radiation through the tissues of a patient’s body in the presence of a strong magnetic field. The computer can then convert this source of energy into a series of sectional pictures of the body’s internal structure without exposing the patient to harmful radiation; therefore, since the late 1980s, MRI technology has become one of the most valg normal and abnormal brain function. By means of functional magnetic resonance imaging it is possible to see the brain of an awake human subject "lighphisticated tasks, simply by monitoring differential oxygen uptake as indicated by changes in magnetism caused by differential blood supply to the areaientists to further understanding of a variety of disparate functions including character change, depression, working memory and amnesia (see PET SCAN). (IP)

**mRNA:** Chemical (messenger ribonucleic acid) responsible for acting as the intermediary between DNA (q.v.) and PROTEINS (q.v.). (MR)

**MSF:** Médecins Sans Frontières (‘Doctors Without Borders’).

**MUCOVISCIDOSIS:** French name for cystic fibrosis. It refers to the predominant phenotype of a group of diseases which have in common a high viscosity of the mucous secretions, and mutations in the same locus, the CFTR gene. (See also CYSTIC FIBROSIS). (GK)

**MULTI- :** Combining prefix indicating more than one, multiples, multiplication, from Latin *multus* meaning ‘many’, ‘much’. (See META-, TRANS-, INTER-, INTRA-, MACRO-, ANTI-) (MP)

**MULTICULTURALISM:** A term emphasizing the diversity and cultural plurality of a melting-pot such as for example Australia, which contains indigenous Aboriginal groups, immigrants from the United Kingdom (1788-present), USA and China (gold rushes), Europe (WWII), South East Asia (Vietnam War) and the Middle East. The term has been criticized for emphasizing difference and encouraging an atmosphere of pluralism, but of course multicultural diversity is actually a desirable source of innovation, variety and exchange. (See CULTURE, CULTURAL PLURALISM, SBS) (MP)

**MULTIDISCIPLINARY:** (Multi- "many") Involving the input of information from many different academic disciplines and professions in

collaboration to solve a particular management or development problem. (See TRANSDISCIPLINARY, INTERDISCIPLINARY, INTEGRATED MANAGEMENT) (MP)

**MULTIFACTORIAL DISORDERS:** Genetic disorders arising out of changes in several genes or in combination of with other environmental factors. Disorders whose genetic components are not the sole cause, but which work with other often environmental factors in determining a disease outcome. Multifactorial disorders include many cardiovascular diseases, most Alzheimer's Disease of old age and some forms of diabetes. See POLYGENIC DISORDERS. (JA)

**MULTILATERAL:** Involving multiple parties or nations, as in a multilateral human rights agreement or trade association. (MP)

**MULTIMEDIA:** The combination of many types of digital media (e.g. text, pictures, audio, video, animation) into one application. Often the product is interactive software (e.g. CD-Rom or website), allowing users to determine their own pathways through information for their entertainment or training. The multimedia revolution is seeing the merging of media and communications industries into multimedia conglomerates able to deliver multiple services through internet and digital TV channels. Awareness of such trends in global media may be important for those wishing to disseminate accessible bioethical information. (See MULTIMODAL COMMUNICATION, INTERNET) (MP)

**MULTIMODAL COMMUNICATION:** Methods of communication which simultaneously employ several semiotic modes to deliver the message. The brain analyses our senses in this way naturally, but modern media and communications technology are increasingly using multimodal formats to deliver interactivity, garnish the message, supplement meaning, intersect cultural barriers, create advertising niches and increase the speed, flexibility and attractiveness of communications. The parallel delivery of several related messages may enhance the likelihood of comprehension across divisions of language and culture, but the trade offs may be simplification and loss of precision. (See MULTIMEDIA, SEMIOTICS) (MP)

**MULTINATIONAL COMPANIES:** Companies with business operations in multiple countries. The assets of major Multinational Companies (MNCs) are greater than some countries. (DM)

**MULTIPLE PREGNANCY:** A pregnancy with more than one embryo or fetus. The risks to the fetus increase the greater the number of fetuses in the same pregnancy. (DM)

**MULTIPLE-USE AREAS:** See MARINE PROTECTED AREAS.

**MUMMIFICATION:** A method of preserving the human body after death by means of special processes of drying and application of chemicals which prevent decay. This method was important to several ancient peoples who held that the body must be preserved whole in order for the spirit to survive in the spirit world. The most notable example of the practice of mummification is ancient Egypt, although examples of mummified human bodies have also been found in the Qadisha Valley in Lebanon, in the Andes, and in Takla Makan. Although most examples of mummified bodies in Egypt were human, the Egyptians also practiced mummification on certain animals which had special religious significance. (AG)

**MUTAGEN:** An agent (e.g. Ultraviolet light, X-rays, certain chemicals) that increases the frequency or extent of mutation. (DM)

**MUTAGENESIS:** A process that results in modification of a DNA sequence. (JA)

**MUTATION:** Any change in DNA sequence that results in a new characteristic that can be inherited. A term coined by Hugo De Vries during 1900s to indicate that individual plants and animals occasionally mutate to give rise to new traits in the progeny. The term comes from a Latin word meaning "to change" which occurs in any gene and at random, heritable changes. Compare POLYMORPHISM, see TERATOGEN. (JA)

**MULTIPLE PERSONALITY DISORDER:** See DISSOCIATION.

**MUTUALLY EXCLUSIVE EVENTS:** See SET THEORY.

**MUTUALISM:** An associative relationship between two species in which there is mutual benefit to both partners, often simply referred to as symbiosis. An example of a mutualistic symbiosis is the interaction between algae and fungi to form lichens. (See SYMBIOSIS, COMMENSALISM, PARASITE). (MP)

**MYCORRHIZA :** Fungal endosymbionts of plant roots that facilitate plant access to resources (usually limiting) like dissolved inorganic nitrogen. Mycorrhiza of legumes reduce atmospheric di-nitrogen, thereby making it available for biological activity. (RW)

**MYCOLOGY :** A branch of botany, the study of the biology of fungi. (JA)

**MYTHOLOGY:** the collective body of tales belonging to ancestral peoples portraying predominantly supernatural characters or events. For example, in Greek mythology the loves, marriages and couplings of the Gods such as Zeus, Poseidon, Aphrodite, produced generations of demigod heroes, who were then enlisted in the struggles for good which became both idea and symbolism for morality. (IP)

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<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>								

**NAFTA:** The North American Free Trade Area provides for freer movement of investments, goods and services between Canada, the USA and Mexico, but not of people. (MP)

**NAGASAKI:** See ATOM BOMB.

**NAIETE :** Literally “a complete environment”, an Australian Aborigf human and environmental wellbeing were to be safeguarded in this driest of continents. (See SUSTAINABLE DEVELOPMENT PRINCIPLES; AUSTRALIAN ABORIGINAL; ANIMISM). (IP)

**NANO- :** (Latin: *nanus* "dwarf") One billionth, or ten to the power of minus nine. This is the scale relevant to atoms and molecules. (See Nanotechnology) (MP)

**NANOTECHNOLOGY:** See NANOTECH. WEAPONS, GREY GOO CATASTROPHE, QUANTUM THEORY.

**NANOTECHNOLOGY WEAPONS:** K. Eric Drexler’s landmark book *Engines of Creation* also acknowledges nanotechnology as potential engines of destruction. Drexler warns that nanotechnology may contain power greater than the scale of the Earth, for example the ‘gray goo

catastrophe' which would see the twist, Drexler propnign power to develop appropriate global nanotechnology defenses such as 'active shields' before the risk of misuse or an accident becomes too great. The dangers of nanotechnology and its emergent properties are already in the popular public consciousness (e.g. Michael Crichton's *Prey* ). The scale of potential effects to humanity warrants ethical attention, however small the likelihood may appear. (See GRAY GOO CATASTROPHE, SMART DUST, SWARM INTELLIGENCE, NANOBOT, ROBOTICS, SPACE WEAPONS, VIRTUAL WEAPONS, BIOWEAPONS) (MP)

**NARCOTIC** : Tending to induce sleep or unconsciousness like a drug which produces a state of numbness (Gk *narkotikos* meaning numbing). (IP)

**NARROW SUSTAINABILITY**: See STRONG SUSTAINABILITY.

**NASA**: abbreviation for NATIONAL AERONAUTICS SPACE ADMINISTRATION of the USA.

**NATALITY**: Birth rate, or new individuals per unit time, can be referred to as natality, the opposite of mortality. (See BIRTH RATE, MORTALITY) (MP)

**NATIONAL AERONAUTICS SPACE ADMINISTRATION**: See NASA of USA.

**NATIONAL HEALTH INSURANCE**: A nationalized system of health insurance to citizens in a country, for example the system used to cover medical costs in the UK is called the NHS. (DM)

**NATIONAL MISSILE DEFENSE**: See MISSILE DEFENSE.

**NATIONAL SOCIALISM**: See NAZISM.

**NATIVE TITLE LEGISLATION - AUSTRALIA** in an effort to establish traditional rights to land, it was ruled on 3<sup>rd</sup> June 1992 that Australia was not "terra nullius" in 1788; that is, native title to land survived the Crown's annexation of Australia, because the continent had been occupied and managed by the customs and laws of ait, successfully fought for the recognition of indigenous peoples" right to their traditional lands (see Mch as John Howard's (the leader of the liberal party and Prime Minister at the time) 10-point plan which, if implemented, effectively extinguishes Native Title. (IP)

**NATO** : North Atlantic Treaty Organization.

**NATURAL** 1. pertaining to or produced solely by Nature or the expected order of things, as opposed to artificial or human made 2. established by ethical certainty or conviction like natural rights (from Latin *natura* meaning nature). (IP)

**NATURAL CAPITAL**: The stock of environmental assets and natural resources existing in the physical environment. Components of natural capital range from currently monitored factors such as mineral, forest or energy resources, through to other important factors such as clean water and atmosphere, biodiversity and ecological support systems. Natural capital requires a broader set of measures and indicators to monitor development and encourage the sustainable use of renewable resources. The metaphor of the "global bank account" reminds us that the generation of traditional economic assets usually (but not always) involves depletion from the parallel account. Both accounts must be



managed sustainably. (MP)

**NATURAL FAMILY PLANNING METHODS** : any method of conception control that rely on coital technique rather than on the use medication or physical devices. During the menstrual cycle there are days of absolute infertility and days of potential fertility when conception ranges from very likely to very unlikely. A number of methods have been devised to help identify the time of maximum fertility so sexual intercourse can be avoided to decrease the likelihood of pregnancy. In order to identify the time of ovulation more precisely other optional extras have been developed; the most common of these are to chart basal body temperature (which rises 0.2-0.6°C post-ovulation) or to have intercourse with aged gametes to increase the chance of a wanted conception or when artificial insemination or extraction of an oocyte for *in vitro* fertilization is planned. (IP)

**NATURAL HERITAGE**: Natural heritage sites are physical or biological features, formations or groups which have outstanding universal value from the point of view of aesthetics, science or conservation. They include landscapes, geological structures, ecological assemblies, rare habitats and habitats containing threatened species. Conservation of natural heritage may be achieved using networks of national parks or reserves and international guidelines such as the 1972 UNESCO Convention concerning the Protection of World Cultural and Natural Heritage. (See HERITAGE, CULTURAL HERITAGE, WORLD HERITAGE) (MP)

**NATURAL LAW** : Rules of conduct derived from nature and considered to be binding upon human society in the absence of, or in addition to, institutional law. (DM)

**NATURAL SELECTION**: The process of differential reproductive success by which genes in a population increase or decrease in frequency with the passage of generations, depending on their contribution to the survival of offspring in which they are carried; arguably the most important of the several mechanisms by which evolution takes place, discovered by Darwin and first described in 1858-59. (DM)

**NATURAL STEP**: Developed by Swedish scientist Karl-Henrik **Robèrt**, *Det Naturaliga Steget* ("The Natural Step") is a set of four sustainability principles stating that a) nature cannot withstand systematic build-up of dispersed matter, b) build-up of persistent chemical compounds or c) deterioration in its capacity for renewal, and that d) efficient use and just distribution of resources are therefore integral to the continuation of life. The Natural Step is a useful conceptual framework which may help organizations to implement sustainable development. Its range is however by no means exhaustive, and in the modern era of biotechnology perhaps a natural additional step would be to add that e) nature also cannot withstand systematic degradation of the informational integrity inherent in organisms and ecosystems. (See SUSTAINABLE DEVELOPMENT PRINCIPLES) (MP)

**NATUROPATHY**: is a relatively recent term (19th/20th century) that is used to describe Western natural therapies that have as their basis a belief that the body has the power to heal itself and that disease is caused by the body trying to rid itself of impurities and restore a state of balance. Treatments are aimed at supporting the body's own healing mechanisms rather than treating symptoms. Mental and spiritual state are also considered important factors in naturopathy. Naturopathy was first used by the German Benedict Lust when he brought this combination of natural therapies from Germany to the US in the 1890s. Naturopaths use a wide range of treatment modalities (eg iridology, herbalism, homoeopathy, massage, diet and exercise, HERB, BUSH MEDICINE) (JW).

**NATURE** : One kind of philosophy says that nature is intelligent, wise and "teleological" in that it strives to achieve purposes and goals. Nature may also be full of spirituality, of what are called *malachim* (angels) in the Bible, and *kami* (gods) in Shinto. Another kind of philosophy says that nature is just the blind and random movement of subatomic particles. Perhaps these philosophies can be reconciled if we

conclude from Heisenberg's Principle of Uncertainty in physics, that subatomic particles are not really physical objects. The reason is that physical objects, like swords and rocks, have definite position, momentum and direction of movement at any given moment, but subatomic particles don't (at least according to Heisenberg's theory). When we think about it this way, subatomic particles seem more like spirits than like dumb matter. They seem a lot like the "spiritual sparks" which Israeli mysticism ( *kabala* ) says make up the world.

Nature is also referred to in natural approaches to health. A natural approach to health would mean to try to eat simple foods -- organic if possible, to live with a minimum of dependence on electricity and fossil fuels, to avoid polluting the environment, and to try to remain healthy, or to solve health problems oneself, avoiding physicians and medicines (even "alternative" ones) as much as possible. One would find time for martial arts, yoga, bicycling, hiking or sports. And if one has health problems, one would re-examine one's lifestyle, diet, environment and way of thinking. One would use natural methods like William Bates' method for improving eyesight without glasses. Or one might respond to back problems with walking and moderate exercise, along with throwing away the mattress and sleeping on wood with a thin pad, rather than surgery. And when ailment cannot be avoided, one might even accept ailments as opportunities to learn lessons for this life or for future incarnations. And one would turn to doctors and medicine of all kinds only as a last resort. Others will not find the time in their busy schedules for these pursuits, but they do seem to find the time for doctors. (FL)

**NAZISM** : German Nationalsozialismus, is also called Nazism or Naziism. Was the totalitarian movement in its practice. Inaction, as well as a vision of annihilation of all enemies of the Aryan race and people as the one and only goal of Nazi policy. (DM)

**NEANDERTHAL MAN**: See *Homo neanderthalensis*.

**NEEDLE EXCHANGE PROGRAMS** : Needle exchange is an important way of reducing the intravenous spread of diseases such as HIV and Hepatitis among victims of heroin addiction. Unlike other injecting drug users such as insulin-dependent diabetics or amphetamine junkies, heroin users often have the feeling of urgency, loss of judgment and lethargy which makes them more susceptible to sharing needles. Government-funded needle exchange programs do not encourage or condone drug abuse but accept it as a reality of life and try to minimize harm by preventing the spread of disease and reducing the dangers inherent in needles littering public spaces. (See HEROIN INJECTING ROOMS, JUNKIE). (IP+MP)

**NEGATIVE EUGENICS**: Policies and programs intended to reduce the occurrence of genetically determined disease. (IP)

**NEGATIVE FEEDBACK**: See FEEDBACK.

**NEGLIGENCE** : In law or ethics, failure to exercise a reasonable degree of care in one's actions. (DM)

**NEGOTIATION**: Negotiation is communication and search for middle ground and common values between opposing sides of a dispute or conflict. Analysis of the conflict should take place before any proposals, to avoid an adversarial bargaining dialogue. In fundamental conflict, cultural values or human needs such as identity and security may not be subject to compromise. In this case to avoid stalemate the negotiators must analyze the respective interests, value systems and context to elucidate tactical compromise without compromising ultimately non-negotiable goals. If opposing sides cannot empathize or communicate with one another then a third party mediator or facilitator may be required for negotiation to take place. Other reasons for negotiation failure can be the belief systems of the facilitator, biased mediation, poor

communication style, lack of teamwork, inflexibility and hidden motivations. (See DISPUTE, CONFLICT, COMPROMISE, CONFLICT RESOLUTION, MEDIATION, FACILITATION, THIRD PARTY, PREVENTIVE DIPLOMACY) (MP)

**NEIJING** : (Yellow Emperor's Classic of Internal Medicine). A classical text of Chinese medicine written about 3rd century bce. This text is attributed to the "Yellow Emperor" (Huang-di). The Neijing provides the basis for Chinese traditional medicine. It is divided into two parts: Su Wen (Plain Questions) and Ling Shu (Miraculous Pivot). The book includes a detailed description of traditional Chinese theory of medicine, including acupuncture (see ACUPUNCTURE). (AG)

**NEOLITHIC AGE** the archeological age beginning around 10,000 BC characterized by agricultural practices. (IP)

**NEOMORTS** : See BRAIN DEATH.

**NEONATAL DEATH**: the death of a live-born infant during the first 28 days after birth; however, early neonatal death is usually considered to be one that occurs during the first 7 days (Greek *neos* new + Latin *natus* born) (see NEONATAL PERIOD). (IP)

**NEONATAL PERIOD**: the period from birth to 28 days of age, during which the newborn must make the physiological and emotional transition from the warmth and security of the womb to independent survival. It is a period when the infant needs protecting from infection and other environmental stresses, normally freely provided through loving care. (IP).

**NEONATOLOGY** : Neonatology is that branch of medicine, which deals with new-born babies. Neonate intensive care units (NICU) treat both premature babies and babies born with serious anomalies. NICU nurses develop a close relationship and intimate familiarity with their patients and their problems, which gives them considerable professional autonomy and recognition of their authoritative status in clinical decision making. Some neonatologists think that eventually the nurses will run the NICU, and the physicians will only be consultants. NICU nursing is therefore a model for nursing ethics.

Some of the most difficult ethical problems in the NICU arise from disagreements between staff and parents. Sometimes the parents want to continue treatment, while the staff are ready to discontinue. In this case, the staff will often make the extra effort, knowing that if they do succeed in saving the baby, it will receive all love and care. But sometimes the parents want to discontinue treatment while the staff want to continue. In this case the fact that the baby is not the parents' property, but a human being in his or herself, may lead the staff to ignore the parents' wishes and to save a human life. But the subsequent burden on the parents cannot be ignored. A policy of saving life whenever possible must be accompanied by the development of appropriate social services and institutional care, in order to ease the burden on parents. (FL)

**NEONATE**: An infant from birth to 28 days of age (see NEONATAL PERIOD). (JA)

**NERVE CELLS** : See NEURON.

**NERVOUS SYSTEM** : See CENTRAL NERVOUS SYSTEM, AUTONOMIC NERVOUS SYSTEM, NEURON AND BRAIN.

**NEST**: 1. Home of an animal, e.g. burrow, bird nest, ants nest. 2. Topological term for a grouping of modules within a network or a subsystem nested within a system. (See SYSTEMS THEORY) (MP)

**NET**: 1. A snare comprised of an interlaced network of lines thrown across an area to catch fish, insects etc. (See DRIFTNETS) 2. Colloquial shorthand for the Internet. (See INTERNET) (MP)

**NETIQUETTE:** ("Internet" + "Etiquette") Online standards of practice and social codes of politeness for e-mail and internet communication. New circumstances in social relations such as anonymity and interactivity on the internet and the dynamics and efficiency of e-mails necessitated this new adaptation of "etiquette". Cyberspace opens up a realm of communication opportunities, but netiquette reminds us that these are connections to real people who deserve ethical online behavior. Nevertheless, the net is often a much more informal and flexible place, with surprising linkages and humorous web avenues, formality foregone in many net interactions, and sloppy spelling and grammar often considered ok in e-mails. (See E-MAIL, INTERNET, EMOTIONS) (MP)

**NETHERWORLD:** Alternative to the heaven-hell model of the afterlife. In various traditions around the world, the souls or spirits of those who have died go to a place called the Netherworld (i.e. the world below), and their existence continues there. In this model of the afterlife, all go to the Netherworld, regardless of the merit of their actions, because this is simply the domain of the dead, just as the previous world is the domain of the living. In the Old Testament, the Netherworld is referred to as She'ol, and no clear mention of either heaven or hell appears in the Old Testament. It would appear that these concepts were borrowed from the Zoroastrian view of the universe (see Zoroastrian). This Zoroastrian view had a profound effect on Judaism, Christianity and Islam. In Greek tradition, the Netherworld was reached by ferry across the river Styx. The ancient Greeks had a custom of burying their dead with a coin in the mouth, so that the dead person would have the fare to pay the ferryman on the river Styx. In Babylonian tradition, the netherworld was reached through a series of gates. (AG)

**NETWORK:** At its simplest, a network is a system of intersection points (nodes), and flow routes (links). This type of system is modeled using 'network geometry' and the 'network flow diagram' in which the nodes cepts (domains of philosophy/information, e.g. the Internet). (See NETWORK DYNAMICS, NEURAL NETWORK, WEB, SYSTEM) (MP)

**NETWORK ANALYSIS :** It is a technique used to control and plan large projects It monitors the progress of the project and plans for the completion of a project in a given time. (JA)

**NETWORK DYNAMICS:** Network dynamics are the factors in networks changing with time. In the 'network flow diagram' the node is a graph vertex and the links are graph edges. 'Flows' (money, information, material) may be one-way or both ways along a 'link' (circuit, road, production chain, economic relationship, internet connection etc.) to be distributed or transformed at a 'node' (individual, town, institution, cluster of activity etc.). A 'connectivity matrix' can be used to arrange numerical network data for statistics. (See NETWORK, SYSTEM DYNAMICS, FEEDBACK, THRESHOLD, CYBERNETICS) (MP)

**NEURAL COMPUTING:** Computational models based on neural networks, which use associative memory, inductive reasoning, pattern recognition, parallel processing, interactive networks and learning algorithms. (See ARTIFICIAL NEURAL NETWORKS, ARTIFICIAL INTELLIGENCE, SMART DUST, GENETIC ALGORITHMS, NEURAL NETWORKS) (MP)

**NEURAL NETWORKS:** 1. Nerve cells (neurons or neural connections) are arranged and act in a network. The neuron is comprised of a nucleus (node), dendrites (inputs), axons (outputs) and synapses (transmission of signals). Patterns of excitation across the network code for larger-scale information or emergent properties such as thoughts. (See NETWORK, NEURON, SYNAPSE, AXON, DENDRITES) 2. Any

network with properties analogous to biological neural networks, for example artificial neural networks in computing. (See NEURAL COMPUTING, ARTIFICIAL NEURAL NETWORKS) (MP)

**NEURAL TUBE DEFECT:** A condition resulting from the failure of the neural tube to close during fetal development, resulting in spina bifida or anencephaly (see SPINA BIFIDA and FOLIC ACID).

**NEUROLOGY:** (Greek: *neuron* "nerve" + *logos* "study" or "science"). Neural biology and medicine. The study of the anatomy, physiology, processes, function and diseases of the brain and nervous system. (MP)

**NEUROHORMONE:** a hormone produced in neurones such as those of the hypothalamus and released into the bloodstream, the cerebrospinal fluid, or intercellular spaces of the nervous system. (IP)

**NEURON :** (Greek *neuron* 'nerve'). A nervous system is made up largely of nerve cells or neurons derived from the embryonic ectoderm and characterized by a membrane potential (electrical charge) that can change in response to stimuli generating action potentials (electrical discharges). Neurons form the grey matter of the nervous system and are found at the periphery of the brain, in the center of the spinal cord, in groups called ganglia outside the brain and spinal cord and as single cells in the wall of organs. Action potentials are generated along an extension of the cell (the axon), which makes junctions (synapses) with other neurons, muscle cells, or gland cells. The primary function of the neuron is conduction and information processing. (See DENDRITES, AXON, SENSES, BRAIN NEUROTRANSMITTERS, NEUROHORMONE, NEUROLOGY). (IP)

**NEUROTRANSMITTERS:** see BRAIN NEUROTRANSMITTERS.

**NEUROTOXIN:** a poison that acts directly on the tissues of the central nervous system; such as the toxin secreted in the venom of certain snakes, or present in the spines of certain shellfish, or produced by certain bacteria (Greek *neuron* nerve + *toxikon* poison). (IP)

**NEUTRON BOMB :** also known as 'enhanced-radiation weapon' or 'nuclear weapon' that is designed to emit radiation penetrating armored vehicles killing the occupants inside. Unlike the atom bomb, it causes little blast or thermal effect but cannot be countered by normal nuclear, biological or chemical precautions. NATO regards this bomb as its only secure defense against armored attack. (See ATOM BOMB, PLUTONIUM). (IP)

**NEW TESTAMENT :** Sacred literature of Christianity, centred on the life and teachings of Jesus Christ. The New Testament was composed by many authors, mainly in the Greek language during the 1st Century. The New Testament advances from the 'eye for an eye' mentality, Christ teaching the oppressed instead to 'love thine enemy'. (See OLD TESTAMENT, BIBLE, JUDEO-CHRISTIAN, CHRIST) (MP)

**NEWLY EMERGED PROBLEM :** In the field of bioethics (see bioethics) this means, a problem or question raised by new scientific and technological procedures or discoveries, which human kind was not faced before. In the field of Islamic bioethics it gains another concept which means a new problem or question which did not deal or answer directly, in the primary sources of Islamic jurisprudence like Qur'an and Hadith (Mostah-dath'ah in Arabic). The Islamic Jurists have to extract the answer for that question, from the primary sources of Islamic law with cooperation with the specialist of the field. (AB)

**NEWLY INDUSTRIALIZED COUNTRIES (NIC):** The NICs are countries which have been able to take advantage of their entrepreneurial skills and manufacturing base to boost their development in the international economic system. These countries often have open, stable political systems but poor workers rights, allowing cheaply produced export goods. The NICs include the "Asian Tiger" States such as Taiwan,

South Korea and Singapore, as well as some emerging South American markets. (See DEVELOPED NATIONS, DEVELOPING NATIONS) (MP)

**NEWTON, SIR ISAAC** : (1642-1727). English scientist who developed, among other things, the general rules of calculus, advanced understanding of the nature of light, constructed reflecting telescopes and formulated the idea of universal gravitation when, by his own account, he saw an apple fall to the ground. In 1687 Newton synthesized his research in one of the most important books in the history of science '*Philosophia Naturalis Principia Mathematica*' or '*The Mathematical Principles of Natural Philosophy*' which established Newton as one of the greatest of all physical scientists. Principia deals with the science of moving bodies and establishes Newton's three laws of motion. (See NEWTON'S LAWS OF MOTION; CLASSICAL MECHANICS; QUANTUM THEORY, EINSTEIN, ALBERT; PLANCK, MAX). (IP)

**NEWTON'S LAWS OF MOTION** : The three laws of motion include the law of universal gravitation, and the law that planets move in ellipses under a central force which is inversely proportional to the square of the distance. (See NEWTON, SIR ISAAC, CLASSICAL MECHANICS). (IP)

**NEW GENETICS** : Modern branch of genetics, using genetic engineering technology dealing with GMOs and cloning. (JA)

**NIACINE** : (Nicotinic Acid). Niacin is a vitamin of the B complex group and occurs in both plant and animal tissue but in different forms. The body changes the niacin from plant food to niacinamide for use while animal foods contain niacinamide ready for use. Niacin takes part in the production of energy and tissue respiration and is essential for the maintenance of a healthy skin, normal functioning of the gastrointestinal tract, maintenance of the nervous system and the synthesis of sex hormones. Pellagra is a niacin deficiency disease. It's water-soluble and not sensitive to heat. The vitamin is found in good quantity in brewer's yeast, unpolished rice, wheat germ, whole grain wheat, dried apricots, almonds, avocado. (See RITON, VITAMIN A, VITAMIN B complex, VITAMIN B, VITAMIN C, VITAMIN D, VITAMIN E, VITAMIN K, MINERALS, MINERAL AND VITAMIN DEFICIENCY). (IP)

**NIC** : See NEWLY INDUSTRIALIZED COUNTRIES.

**NICHE**: (Latin: *nidus* "nest") The place or role of a species within an ecosystem. The combination of tactics and resources which comprise the competitive strategy used by a species for success in natural selection. The ecological niche of a species may be defined by its food, shelter, foraging habitat, mating season and other ecological interactions. A niche may also refer to any competitive position particularly suited to the occupier of that position, such as a person's niche in the workplace, or a specific market which is advantageous to a company. (See ECOLOGICAL NICHE, NICHE DIFFERENTIATION) . (MP)

**NICHE DIFFERENTIATION**: Co-existence within a species or between similar species who share fundamentally the same ecological niche, but are distributed with different sub-habitats, seasonal periods and/or habitat partitions as a result of resource competition. (See NICHE, ECOLOGICAL NICHE) (MP)

**NICOTINE** : A liquid alkaloid obtained from the dried leaves of the tobacco plant *Nicotiana tabacum* first synthesized in 1904. Nicotine is an extremely poisonous drug where a few drops in the stomach may be sufficient to cause death due to respiratory paralysis. Since the drug is readily absorbed through the skin rapidly entering the bloodstream, smoking is the most effective method to gain a quick fix. Pharmacologically, nicotine stimulates the sympathetic autonomic nervous system and drug-dependence readily develops being characterized

by a strong desire to continue to smoke. (See TOBACCO, SMOKING, ADDICTION). (IP)

**NICOTINIC ACID** : See NIACINE.

**NIETZSCHE, FRIEDERICH** : German philosopher of exceptional originality (1844-1900). Nietzsche despised Christianity and talked of "the death of God" and the impendefrequently polemises the concept of the *Übermensch* (superman) with exceptional capacities, able to rise above the common herd, freed from a servile dependence on God. Many of his writings anticipate later philosophical and cultural developments including a rejection of the view that things and values have an existence in themselves (rather than in relation to others) and a recognition of the importance of power in human relations. (MR)

**NIH**: National Institutes of Health of the USA.

**NIMBY**: Shorthand for "Not In My Back Yard", highlighting public concern about the location of potentially dangerous nuclear, industrial and biotechnology developments. (MP)

**NITROGEN**: An abundant, chemically inert gas that makes up 78% of the atmosphere, but unlike carbon dioxide which photosynthesizers use directly, nitrogen cannot be used by most organisms in its gaseous form but has to be converted into biologically useful forms by a few species of bacteria and cyanobacteria. Usable nitrogen is often in short supply in ecosystems and is the reason why it is supplied in commercial fertilizers. (See NITROGEN CYCLE, NITROGEN FIXATION, EUTROPHICATION). (MP & IP)

**NITROGEN CYCLE**: (Greek: *nitron* "soda" + *genein* "to produce" + *kyklos* "circle"). The conversion of organic molecules containing nitrogen (a component of amino acids) into inorganic molecules (mostly in the form of nitrates or ammonia) in several stages by different organisms, followed by their uptake into plants and organic molecules. This movement of nitrogen among organisms accounts for about 95% of all nitrogen fluxes on Earth (see NITROGEN FIXATION & NITROGEN). (MP & IP)

**NITROGEN FIXATION**: The process of conversion or fixation of inorganic nitrogen gas from the atmosphere into substances such as ammonia, which makes nitrogen available to living organisms. Nitrogen fixation is essential in the synthesis of amino acids, proteins and other nitrogen-containing compounds. The organisms responsible for nitrogen fixation are either symbiotic bacteria living in association with a plant, such as those living in the root nodules of leguminous plants or inside lichens, or free-living forms such as blue-green algae. (See NITROGEN CYCLE, BIOGEOCHEMICAL CYCLES). (MP+IP)

**NITROUS OXIDE** : Nitrous oxide, (N<sub>2</sub>O) is a colorless gas used as a short-lasting, incomplete general anesthetic in dentistry, childbirth and minor surgery. It should be administered in combination with oxygen to prevent anoxia and asphyxiation. Also called laughing gas, it induces giggling and temporary impairment of senses and is sometimes abused recreationally by inhaling commercially available "whipped-cream bulbs" through a cloth filter. (IP, MP)

**NOAA**: National Oceanic and Atmospheric Administration (US).

**NOISE**: 1. Sound waves, measured in decibels. (See NOISE POLLUTION, DECIBEL) 2. Data which is random or unorganized; the opposite of 'information' precisionerence; noiP)

**NOISE POLLUTION**: 1. Sound, at sufficient volume or constancy, can become a form of pollution. Noise at greater than 100 decibels (hard

rock concert, jack-hammer, jet engine) can cause pain and hearing impairment. Noise which is at a lower level but constant (e.g. underwater Low Frequency Active Sonar used by the US Navy) also acts as a broad environmental pollutant. (See DECIBEL, LOW FREQUENCY ACTIVE SONAR) (MP)

**NON-BIODEGRADABLE:** Inorganic or persistent organic materials in human pollution which cannot be broken down in the environment by bacteria and other decomposers within a time frame of many generations. These long-lived waste products may be present in the atmosphere, land and water systems, and include non-compostable domestic wastes and chemical/industrial constituents of the solid waste stream. (See BIODEGRADABLE, PERSISTENT ORGANIC POLLUTANTS) (MP)

**NON-CONSUMERISM:** See DEMATERIALIZATION.

**NONDIRECTIVE COUNSELING:** Counseling in which the counsellor lets the person being counselled make up their own decision without leading or dogmatically stating which is the best choice. (See GENETIC COUNSELING). (DM)

**NON LETHAL WEAPONRY:** Weapons designed to detect, prevent or negate aggression without taking human life. Perhaps the turning point in the concept of weapon lethality was realization of the ridiculous levels of destructive power contained in nuclear weapons. Even with conventional weapons use of lethal power is counter-productive, exacerbating hatred and revenge attacks. In this age of peacekeeping we must not succumb to the notion that war is about killing. Non lethal weaponry includes rubber bullets, tear gas, catch-nets, sticky foam, calumet & sleep agents, microwave guns, infrasound, blinding lasers, and mines & grenades designed to maim not kill. Other weapons are designed to immobilize vehicles, machinery or command & control systems, for example cyber-warfare, directed energy weapons, high power microwaves, metal embrittlement, anti-traction lubricants and polymer adhesive glue. Another class are weapons designed only to minimize allied casualties, for example body armor, unmanned aerial vehicles and virtual warfare. One argument says that any world power wanting to exert influence based on a reputation of human values should be focused on non lethal weaponry. Even hardened old military commanders see strategic and psychological advantage in wounding. The horrible after-effects of wounding have sparked protest - possibly people are more desensitized to killing than to the creation of cripples. Skeptics are concerned about the spread of crippling weapons in that grey area approaching lethality. They may be misused against peaceful protesters in crowd control at the hands of oppressive security forces. There is also potential for misuse such as terrorist sabotage and hostage capture. Conversely, one of the most promising applications is in terrorist response and hostage rescue. (See LASER WEAPONS, CYBER WARFARE, VIRTUAL WEAPONS, SPACE WEAPONS, JUST WAR, PEACEKEEPING, GENEVA CONVENTIONS, DISARMAMENT, DEMILITARIZATION) (MP)

**NONMALEFICENCE:** The state of not doing harm or evil; compare *beneficence*. 1.non-harmful or non-evil, bioethics= loving life 2. Medical usage non-malpractice or conduct, an obligation to not inflict pain, harm, misinformation or risk on others- avoid malevolence [Latin *non not* ] see MALIFICENCE. (DM)

**NON-OBVIOUSNESS:** One of the criteria applied for PATENTs to be awarded. (See OBVIOUSNESS) (DM).



**NON- PATERNITY:** The presumed father is found to not be the genetic father. (DM)

**NON-REPRODUCTIVE CLONING:** See STEM CELLS.

**NON-RENEWABLE RESOURCES:** Sources of energy and materials from nature which are unable to be replaced or regenerated within a timescale similar to the human utilization of the resource. Examples include fossil fuels such as coal, oil and natural gas, or irreplaceable ecological resources such as endangered species/habitats, old-growth forests and wilderness areas. (See RESOURCE, RENEWABLE RESOURCES, RENEWABLE ENERGY) (MP)

**NON SEQUITUR:** Latin for “it doesn’t follow”, a *non sequitur* is a statement whose conclusion doesn’t follow from its premises. (See REDUCTIO AD ABSURDUM, FALLACIES, PREMISES) (MP)

**NON- THERAPEUTIC :** Something which does not serve the purposes of benefiting an individual patient. (DM)

**NONTHERAPEUTIC RESEARCH :** Research that is not intended to benefit the subject on whom it is performed . (DM)

**NONVIOLENCE:** See PACIFISM, AHIMSA.

**NONVIOLENT RESISTANCE:** Non-violent resistance may include strategies of diplomacy, political means, appeal to world opinion, civil disobedience, industrial action, protest and nonviolent direct action. Examples of nonviolent resistance include Gandhi’s pacifist defiance of the otherwise well-meaning proted in the issue. In the words of advice of John F. Kennedy to oppressive governments: “Those who make peaceful revolutions impossible will make violent revolutions inevitable.” (See PACIFISM, NONVIOLENT DIRECT ACTION) (MP)

**NONVIOLENT DIRECT ACTION:** Protests outside the institutionalized framework which do not incorporate aggression, threat, violence or property damage. Activism which is morally steadfast is more able to provoke admiration and sympathy for the cause. (See NONVIOLENT RESISTANCE, DIRECT ACTION, CIVIL DISOBEDIENCE, ACTIVISM, PACIFISM, PEACE MOVEMENT) (MP)

**NOOSPHERE:** The noosphere is the cognitive layer of the Earth, used by Teilhard de Chardin to imply some kind of emergent ‘global brain’. (See INFOSPHERE, BIOSPHERE, INTERNET, ARTIFICIAL INTELLIGENCE, SMART DUST, GLOBAL BRAIN) (MP)

**NORMAL DISTRIBUTION:** The ‘normal distribution’ is a function in which the variables fit the symmetrical, unimodal ‘bell curve’, which haMany ecological variables and biological functions approximate the normal distribution. (See FREQUENCY DISTRIBUTION, PARAMETER, PARAMETRIC STATISTICS, SKEW, KURTOSIS, EXPONENTIAL) (MP)

**NORMATIVE ETHICS:** See ETHICS .

**NORTH:** A term used in international political economics to refer to the First World, consisting of the developed countries which are more advanced in wealth and welfare. These countries are generally to be found in the Northern Hemisphere, for example Europe, North America and parts of Asia, and also including Australia and New Zealand as part of the "North" despite their geographical location. (See DEVELOPED NATIONS, SOUTH) (MP)

**NORTH - SOUTH DIALOGUE:** refers to the technological and economic disparity between developed and developing countries where 'North' refers to technology - producing countries and 'South' refers to technology - importing countries. (IP)

**NOVELTY:** one of the criteria used in the evaluation of patent applications. The invention or discovery being evaluated must be new and must not have previously existed through the work of others in order to be accepted on the grounds of novelty. (DM)

**NOVOCAINE:** trademark for the anesthetic procaine hydrochloride. Procaine is administered for local anesthesia and for regional; such as epidural, procedures (Latin *novus* new + (co)caine) (see ANESTHESIA). (IP)

**NREN:** National Research and Education Network (US).

**NUCLEAR ENERGY :** Energy generated by fission or fusion of atoms. See NUCLEAR FISSION and NUCLEAR FUSION. (RW)

**NUCLEAR FISSION :** The process of splitting atoms apart, releasing smaller atoms, excess neutrons, and large amounts of energy. Fission is used in commercial power generation. Though initial claims predicted power too cheap to meter, nuclear power is actually rather expensive. Accidents in the nuclear power industry are not common, but some have widespread and very long lasting consequences. The area around Chernobyl, site of the world's worst nuclear fission accident, is highly contaminated with radiation and will remain so for millennia into the future. No safe permanent storage of nuclear waste has yet been developed and deployed. (RW)

**NUCLEAR-FREE ZONE :** A region with local authority to ban the transport, storage or deployment of nuclear materials, facilities, weapons or waste. There are regional nuclear-free zone treaties (e.g. New Zealand), and treaties prohibiting the placement of nuclear weapons in space orbit, on the moon, in Antarctica or on the ocean floor. (See NUCLEAR NON-PROLIFERATION) (MP)

**NUCLEAR FUSION :** The process of joining together of atoms to produce heavier elements and large amounts of energy. Fusion powers stars and fuel for fusion is abundant on Earth, but this process has not yet been successfully harnessed by humans for power generation.

Nuclear fusion bombs have been developed and tested, but never used in a conflict. (RW)

**NUCLEAR SUBMARINE (SSBN):** A nuclear submarine is a covert underwater missile-tube powered by a self-contained reactor, and may itself be considered a nuclear weapon in addition to any nuclear-capable submarine-launched ballistic missiles (SLBM) it may be carrying. The acronym referring to a nuclear submarine (SSBN; 'Submarine, Strategic Ballistic Nuclear') is an apt summary of the purpose and capabilities of these underwater weapons. (See SUBMARINE, SLBM, NUCLEAR WEAPON) (MP)

**NUCLEAR TRANSFER TECHNOLOGY:** Technique of transfer of nucleus from an adult somatic cell to an eunucleated oocyte of another individual. Used in the creation of cloned animals E.g. Dolly, the sheep. (JA)

**NUCLEAR WEAPONS :** Weapons of mass destruction involving uncontrolled nuclear fission or fusion reactions, emitting a huge explosive blast, electromagnetic pulse and lethal radiation. Nuclear weapons include the atom bomb (e.g. Hiroshima and Nagasaki; uranium/plutonium fission), hydrogen bomb ('H-bomb'; hydrogen fusion), and neutron bomb ('enhanced-radiation weapon'; high mortality from radioactivity but reduced blast-damage to infrastructure). Among the nuclear-capable missiles are the land-launched inter-continental ballistic missile (ICBM) and the submarine-launched ballistic missile (SLBM). Likely potential developments in nuclear weaponry include missile defense systems in space ('Star Wars'), smaller low-impact nuclear weapons, multiple miniature missiles ('bomblets'), and potentially also the 'dirty bomb' and 'suitcase nuke' of the terrorist. (See ATOM BOMB, HYDROGEN BOMB, NEUTRON BOMB, ICBM, NUKE, DIRTY BOMB, NUCLEAR SUBMARINE, MISSILE DEFENSE, NUCLEAR-FREE ZONE, NUCLEAR NON-PROLIFERATION) (MP)

**NUCLEAR WINTER** is a term used to describe a possible catastrophic atmospheric effect that might follow nuclear explosions. The heat

from the nuclear blasts and from resulting fires would result in powerful updrafts carrying combustion products to stratospheric regions. The reflection and scattering of sunlight by these particles would then result in freezing temperatures even in summertime; such as occurred in 1816 - "the year without a summer" - following the massive Tambora, Indonesia, volcanic explosion of 1815. Carpet bombings of cities and other pointless military activities also produce firestorms that create their own particle-laden updrafts into the atmosphere (see AEROSOLS). (IP)

**NUCLEIC ACID:** A macromolecule composed of sequences of nucleotide bases, DNA or RNA.

**NUCLEOTIDE:** A subunit of DNA or RNA consisting of a nitrogenous base (adenine, guanine, thymine or cytosine in DNA; adenine, guanine, uracil or cytosine, in RNA), a phosphate molecule, and a sugar molecule (deoxyribose in DNA and ribose in RNA). Thousands of nucleotides are linked to form the DNA or RNA molecule. See *DNA, base pair, RNA* The human genome has 3.3 billion base pairs. (DM, IP)

**NUCLEUS:** The membrane-enclosed structure in the cytoplasm of eukaryotes that contains the chromosomes. (DM)

**NUDISM :** Nudism is a bioethical doctrine, which encourages public nudity. This may be at special beaches or resorts, or in daily public life. Reasons for nudism may be for social protest, for health and relaxation, or for openness among people.

*Social Protest:* In a well publicised event in the 1960's a young woman walked into a banquet of the stockholders of a large corporation which was producing chemicals for weapons use by the American military in Vietnam. She was totally nude, and carried a pig's head on a platter. According to reports, stockholders shouted: "Beat her. She's naked", and some indeed attempted to beat her. The event demonstrated the violent nature of some of the stockholders and their desire to punish the woman for her nudity rather than for the cruelty perpetrated upon the pig. The fact that the stockholders objected to the young woman's harmless choice of fashion, but did not object to Vietnam war profit-making, was the most salient social statement. Bioethicists, indeed, might research the values of societies where many forms of dishonesty, fraud and cruelty are tolerated, but where one who chooses to go out without clothing is considered criminally insane.

*Health and Relaxation:* Nudists claim healthful benefits for exposure of the entire body to air and sunlight. Of course too much direct sunlight may be correlated with skin cancer, at least among some genotypes and in some latitudes. But the danger is little less to wearers of bathing suits. Health benefits may also be no less to wearers of bathing suits. But it has been anecdotally observed that if one takes a cold shower, and then steps out nude into a cool, well ventilated place, one will be quite comfortable. But as soon as one dons even an item of underwear, one will immediately feel cold. This observation might be tested scientifically. Another health benefit which nudists claim is that if one's body is exposed, then one has an added incentive to eat and exercise properly to keep one's body fit and presentable. Nudists consider it ridiculous that sedentary people who do not control their appetites, are tolerated while they display their unsightly, corpulent bodies on public beaches, so long as they wear the slightest bathing suit. But fit, healthy nude people may be persecuted.

*Openness among people:* The motive of openness and that of social protest cannot be entirely separated. A society of greed, exploitation and cruelty might be encouraged in part by a lack of understanding and sensitivity among people. The openness of social nudity might encourage us to understand one another better, and to treat one another with more sensitivity and kindness. If, moreover, we are not secretive about our bodies, perhaps this will lead us to be more honest with one another about other aspects of our lives. The Internet, with the aid of illegal and legal hackers, has opened to the public vast areas of our lives which one were secret. *The Death of Privacy* may be approaching. Nudism may be seen as an affirmation of accepting *the Death of Privacy* willingly, a symbol of breaking down barriers, hypocrisy and deceit.

Although nudism gained in social acceptance in the 1960's and 1970's in Western countries, fear of the AIDS epidemic, lead in the 1980's to a

revival of sexual conservatism and an increase in modesty. But nudism need not be accompanied by sexual carelessness.

On the other hand, no ideology can be taken absolutely, and all have their flaws. Nudism is not a panacea, and nudists are just as capable of most kinds of crimes as anybody else. The only crimes which nudism can quite certainly eliminate are exhibitionism and voyeurism.

It has been observed that nudism, in the Northern Hemisphere, increases, as the latitude becomes more northerly. This may be because wherever summer sunshine is rarest, it is more precious and people make more effort to enjoy it. But this observation does not seem to have been scientifically studied. (FL)

**NUKE** : 'Nuke' is trivializing US shorthand for nuclear weapon; to use one on somebody is, to use the common but thoughtless colloquialism, to 'nuke' them. (See NUCLEAR WEAPONS) (MP)

**NULL HYPOTHESIS**: The mutually exclusive or inversely opposite set to the hypothesis. Often the null hypothesis asserts no differences between treatment populations. Disproving the null hypothesis adds weight to the hypothesis. (See HYPOTHESIS, FALSIFICATION, SCIENTIFIC METHOD, TYPE I ERROR) (MP)

**NUREMBERG CODE**: A set of legal principles for medical human experimentation, signed by the judges presiding over the 1947 Nuremberg Medical Trial investigating World War II atrocities. Among their prescriptions was the principle of informed consent, that nobody should be involuntarily subjected to scientific experimentation. The Nuremberg Code has been internationally recognized by relevant institutions and human rights groups. (See NUREMBERG TRIALS) (MP)

**NUREMBERG TRIALS**: The trials at the end of World War II of Nazi leaders and war criminals for genocide, crimes against humanity, treatment of prisoners and other crimes committed during the war. There were a total of 177 trials, ranging from the death sentence to acquittal. The Nuremberg Trials and Nuremberg Code were an important precedent in the historical progress of international war law. (See NUREMBERG CODE, INTERNATIONAL WAR LAW) (MP)

**NURSING ETHICS**: Nursing is an ethical endeavour. An ethics of nursing has long been debated and written about. It is only since the 1980s that nursing ethics has become a subject for academic study and analysis. A nursing ethic is closely allied to an ethic of care and thus to the feminist principles of that domain. As a theory, it has, however, often been disputed as not being rigorous or rational enough. In turn this has also been disputed, notably by Maurice Rickard, Helga Kuhse and Peter Singer (1), who have shown that there are two distinct ways of reasoning ethically that are not based on either the traditional justice (2) or feminist (3) premises since women and men use both possibilities equally in similar circumstances. The decision, however, depends on the relationship between carer and cared-for. The closer one is to the cared-for person, the more one's decisions are based on intuition, conscience, care, compassion etc, and the further away one is, the more one's decisions are based on justice and logic. The two ways of reasoning and decision making are both necessary and valid.

In health care, the relationship between nurse and patient or client is of vital importance. It is necessary for simple care, but it is even more important when the needs of holistic care are taken into account. Holistic care demands that nurses are aware of all the needs and circumstances of a person, and in particular also the person's emotional, psychological and spiritual resources. To understand these, a trusting relationship is vital. Such a relationship is based and support each other, and therefore share each other's life for the duration of the relationship (4).

As a discipline, nursing ethics is however, accepting within it also many other approaches. A particularly popular approach is from virtue, which considers the moral basis of the person (5, 6). This approach questions first why someone should be honest, good, loyal, trusting, etc and from what motivates these virtues (or values) stem. This demands not only personal awareness and insight, but also a good understanding of group and social psychology.

Approaching nursing ethics from human rights is also popular, but not without problems. Human rights "serve as the moral underpinnings of contemporary international relations, setting the individual at the core of national and international concerns" (7). Human rights are difficult enough to prove and maintain for issues such as freedom from torture, freedom of expression, religion and association (8), thus claiming a right to health is that much more difficult. It is hard enough to get the health care needed when resources are limited, in places where there is simply no provision for health, claiming a right to it makes little sense. However, all nurses must be aware of the need for respect for the person, and to uphold rights to privacy (confidentiality), adequate information and to be treated humanely. It is too often taken for granted that these rights are inherent in health care, but this should never be assumed.

Using stories as a basis for care has always been customary in nursing, but narrative ethics takes the field further into deeper reflection. Sally Gadow (9) has made a strong point for relational narratives. The starting point for this theory is the uniqueness of the individual: but individuals are in relation. Gadow considers this in the context of postmodernism, where few certainties exist. What a person has and is, therefore, matters above all, and this has to be expressed and heard. In order to make sense of an illness or tragedy, a person has to tell his or her story, and this has to be heard and acknowledged. As the story unfolds, so the ethics of a given situation also unfolds.

This type of ethical enquiry is closely related to an ethic of care. Theories have different bases, but the essential is that those who are cared for are respected and helped. This needs nurses who are able to give this kind of care, that is, who can and do act ethically and who are supported and educated in this endeavour. Ethics education should therefore not only be a discreet subject in a curriculum, but integrated through the whole of pre- and post-registration nursing education.

If nursing ethics has an international language and norms remains disputed. Through travel and by reading, knowledge becomes internationalised, but cultural norms vary considerably. The main difference is between cultures that lay emphasis on the individual (North America and Europe) or on the family and groups (Asia, Africa, South America). The two cultures are not exclusive, but it does mean that certain norms that are taken for granted in Western cultures, such as autonomy, cannot apply globally. This makes it imperative that nursing ethics is therefore approached from the basis that is most fitting in a given situation or culture. (VT)

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(9) Sally Gadow "Relational Narrative: The Postmodern Turn in Nursing Ethics", *Scholarly Inquiry for Nursing Practice* , **13** :1, 57-70, 1999.  
(VT)

**NURSING HOMES** : Facilities that provide nursing supervision and limited medical care to persons who do not require hospitalization.

(DM)

**NUTRIENT CYCLE**: See BIOGEOCHEMICAL CYCLE.

**NUTRITION**: The science of food, the nutrients and other substances contained therein, their action, interaction, and balance in relation to health and disease. (DM+IP) (See NUTRITIONAL DEFICIENCY, MALNUTRITION)

**NUTRITIONAL DEFICIENCY**: Imbalance in nourishment to body. (JA)

## O

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**OBESITY**: (Latin: *obesitas* 'fatness') An abnormal increase in the number and/or size of fat cells in the adipose tissues mass. Most children with excess fatness do not have an endocrine (hormonal) disorder. If they become obese during the phase of infant growth, which is determined by nutrition, they will not only be fat but also tall for the family. All of the endocrine causes of obesity are associated with a diminished growth-rate and short stature. The child who is short and fat or the child who has an intellectual problem and fatness may well have an endocrine disorder in which case detailed investigation is needed (Latin *obesitas* fatness) (see ANOREXIA NERVOSA; BULIMIA NERVOSA). (IP)

**OBJECTIVITY**: See SUBJECTIVITY.

**OBLIGATION** the act of binding by a social, legal or ethical tie; such a duty, contract, promise, or any other requirement that compels one to follow or avoid a certain course of action. In ethics - general moral considerations, in bioethics obligation to autonomy, beneficence, non-maleficence, justice and confidentiality. (IP)

**OBSENIITY** : One hears that "pornography (q.v.) is a function of geography". What is accepted in one location or society is shocking in an

other. The same can be said of obscenity. And time is surely another factor. Words which used to be considered obscene are now quite acceptable, even among quite conservative people. But it does seem that some language is absolutely, and not just relatively obscene. This would be, for example, any gross insult of an individual human, which emotionally hurts the insulted person. (FL)

**OBSTACLE:** See PROBLEM.

**OBSTETRICS:** The branch of medicine dealing with the management of pregnancy and childbirth.(see GYNOCLOGY). (DM)

**OBVIOUSNESS:** Obviousness is one of the criteria used in the evaluation of patent applications. Obviousness addresses the degree of difference between the invention being evaluated and that is already known and available. (DM)

**OCEAN POWER :** Forms of ocean power include tidal energy, wave power, current power and thermal energy conversion. The potential energy of the oceans is enormous, but there are technological difficulties in harnessing this power for human use. (See TIDAL ENERGY, WAVE POWER, RENEWABLE ENERGY) (MP)

**OCCIDENTAL:** (Latin: *occidere* "to fall" in reference to the setting sun). "Occident" is a formal literary term for West, and Occidental culture, or the Occident, refers to Western civilization based around Europe and North America. (See WESTERN CIVILIZATION, ORIENTAL) (MP)

**OCCUPATIONAL EXPOSURE :** Exposure to potentially harmful chemical, physical, or biological agents that occurs as a result of one's occupation. (DM)

**OCCUPATIONAL HEALTH:** The health of employees working in different occupation faces different risks to persons health. (DM)

**OCCUPATIONAL MEDICINE :** The branch of medicine concerned with the promotion and maintenance of the physical and mental health of employees in an occupational setting. (DM)

**OCCUPIER FOR HANDLING WASTES :** Any person/s or company that generates Hazardous waste substance that are specified by a competent authority who shall ensure that all such wastes are carefully and properly handled and disposed off without any adverse effects to those who handle the waste disposal or to the environment. and has the responsibility for their proper collection, reception, treatment, storage and disposal either by a facility or through personal arrangement. (JA)

**OCKHAM'S RAZOR:** A loose principle of science closely related to 'parsimony', stating that assumptions should be minimized and simplified. Named for the philosophical ideas of William Ockham (1285-1347), Ockham's Razor cuts away unnecessarily complicated theories and identifies those with simplicity of theory construction. (See PARSIMONY, SIMPLICITY) (MP)

**OECD:** Organization for Economic Cooperation and Development.

**OIKOS** Greek word meaning "house" or dwelling place. Is the key concept describing disciplines such as ecology, economics and ecumenics. (IP)

**OLD TESTAMENT :** Sacred literature of Judaism and Christianity, also known as 'Jewish Scriptures' or 'Hebrew Bible', composed in Hebrew (some parts Aramaic), and fixed around 100 ACE after a long oral tradition. The Old Testament includes the first five books Genesis to Deuteronomy, which as a unity comprise the Torah or Pentateuch. The Old Testament chronicles the histories of Adam, Noah, Abraham, Moses, David, Solomon and other holy figures and sons and daughters of Israel, and suggestions for moral conduct such as the Ten

Commandments. (See NEW TESTAMENT, TORAH, BIBLE, JUDEO-CHRISTIAN) (MP)

**OLFACTION** : (Latin *olfacere* 'to smell'). The sense of smell. The nose has a dual function - respiration and the sense of smell. The sensory nerves of smell have their origins in special cells in the mucous membrane of the roof of the nose. On each side of the nasal septum nerve fibers from these cells pass to the olfactory bulb - the area in the forebrain where the olfactory nerves terminate and the olfactory tracts arise. Nerve fibers form the olfactory tract (first cranial nerve) pass backwards to the olfactory area in the temporal lobe of the cerebral cortex where the impulses are interpreted and odor perceived. All odorous materials give off chemical particles that are carried into the nose with the inhaled air and stimulate the nerve cells of the olfactory region. 'Sniffing' concentrates more particles more quickly in the roof of the nose thus increasing the number of special cells stimulated and the perception of smell. The sense of smell in humans is generally less acute than in other mammals. (See ANOSMIA, SENSES). (IP)

**OLIGONUCLEOTIDE** : Synthetic short DNA fragment used in molecular biology techniques, either for amplifying DNA (in PCR reactions) or for visualizing a complementary sequence in native DNA, cDNA or RNA (in dot or slot blot hybridizations). (GK)

**OLIGOSPERMIA**: Scarcity of sperm in the semen.

**OMEGA POINT THEORY**: An audacious scientific proposal by cosmologist Frank Tipler, founded in work by J.B.S. Haldane, John Bernal, Paul Dirac, Freeman Dyson and Teilhard de Chardin. The Omega Point is the singularity at the boundary of all future time in a closed universe. At this point, Tipler argues that the cosmological laws of physics imply that humans and all life will be resurrected into mathematically-defined states of omnipresence, omniscience and omnipotence - a fate remarkably similar to that proposed by major religious eschatology and theology. Including an extensive mathematical appendix for scientists, his popular '*Physics of Immortality*' asserts "that theogon my career as a cosmologist some twenty years ago, I was a convinced atheist... I have been forced into these conclusions by the inexorable logic of my special branch of physics." (See ESCHATOLOGY, SINGULARITY, ANTHROPIC PRINCIPLE, HOLOGRAPHIC UNIVERSE THEORY, PARALLEL UNIVERSES THEORY) (MP)

**ONCOGENE**: A gene, one or more forms of which is associated with cancer. Many oncogenes are involved, directly or indirectly, in controlling the rate of cell growth. (DM)

**ONCOLOGY** : A study involving the formation of tumors and cancer cell formation. (JA)

**ONCOMOUSE** : Strain of mice genetically engineered to be more susceptible to cancers. The original oncomouse was developed at Harvard Medical School and patented in 1988. It soon became something of a *cause célèbre* as campaigners, particularly in Europe, argued that it was morally repugnant to design an animal to be likely to develop cancer. Those in favour of the existence of oncomice tend to argue on utilitarian grounds that the strains when used in research might well be beneficial to humans. (MR)

**ONTOGENY**: (Greek: *ont-* "being" + *geny* "birth") The sequence and course of development during the life of an individual organism. (See PHYLOGENY) (MP)

**ONTOLOGICAL**: Refers to actual existence in reality as distinct from in thought or in the imagination. (DM)

**ONTOLOGY**: (Greek *ont-* "being" + *logos* "discourse" or "reason") The branch of metaphysics concerned with being, or existence. (MP)

**OOCYTE**: The immature female germ cell. It is called an ovum when it matures after the penetration of the sperm during fertilization and the



completion of the second meiotic division. (DM+IP)

**OPEC** : Organization of Petroleum Exporting Countries.

**OPEN ACCESS**: A system in which resources are available to everyone. (See TRAGEDY OF THE COMMONS) (MP)

**OPEN QUESTIONS**: 1. Questions without an answer, open to anyone's opinion. 2. Questions which trigger thinking because they have a lot of latitude available for the answer, such as 'And?', 'Therefore?', 'Why?', 'How?' and sometimes 'What?'. (See CLOSED QUESTIONS) (MP)

**OPERANT CONDITIONING** : Modification of behavior through the use of positive and/or negative reinforcement. (DM)

**OPERATING SYSTEM**: Computers: the software platform upon which computer applications and the user interface are based, for example DOS, Windows or Linux for PCs, Unix for Internet servers, and recently TinyOS for small networked microprocessors like 'smart dust'. (See INTERNET, SMART DUST) (MP)

**OPHTHALMOLOGY** : The branch of medicine concerned with the eye, its diseases, and refractive errors. (DM)

**OPPORTUNITY**: See OPPORTUNITY COST.

**OPPORTUNITY COST**: The value of foregone opportunities or alternatives unable to be achieved because of time or money towards some other option. Examples include the opportunity cost of excessive military spending and the opportunity costs of being a couch potato in front of the TV. (See ALTERNATIVES, EXTERNALITIES) (MP)

**OPPOSABLE THUMB** : One of the fundamental evolutionary adaptations setting human ancestors apart from other animals, the opposable thumb (able to oppose each other finger, grip, pinch and precisely manoeuvre objects in the hand) enabled the early development and extensive use of tools. (MP)

**OPTICAL DATING**: Relies on quartz timing which depends on the counting of electrons trapped by naturally-occurring mechanical forces in the mineral of interest. These electrons are trapped at a regular rate and are released by the sunlight's energy (zero time) eing directly proportierstanding (see THERMOLUMINESCENCE DATING AND RADIOCARBON DATING). (IP)

**OPTIMIZATION**: The process in decision-making in which the "optimal" or best solution is arrived at through analytical comparison of the alternative courses of action. Management models are often designed in order to optimize certain factors unfortunately more commonly economic measures than social or environmental outcomes. (See OPTIMAL SUSTAINABLE YIELD, SENSITIVITY ANALYSIS) (MP)

**OPTIMUM SUSTAINABLE YIELD**: The concept of 'maximum sustainable yield' has given way to 'optimum sustainable yield'. This is a management anithout being depleted. 'Optimum' does not imply 'best' in an economic sense, but a generally lower 'safe' levy principle. (See SUSTAINABLE YIELD, MAXIMUM SUSTAINABLE YIELD, CARRYING CAPACITY, THRESHOLD MANAGEMENT, PRECAUTIONARY PRINCIPLE, UNCERTAINTY) (MP)

**OPTIMISM:** See PESSIMISM.

**OPTION VALUE:** The willingness to pay for the preservation of ecosystems and nature in order to retain the potential option of perhaps visiting or utilizing them at a later date. (See INTRINSIC VALUE OF NATURE, INSTRUMENTAL VALUE OF NATURE, BEQUEST VALUE, USE VALUE, ENVIRONMENTAL VALUATION) (MP)

**ORDER:** 1. A command, instruction or task allocation from a superior such as a corporate boss, policeperson or military officer. The assumption of unquestioning compliance may imply the loss of individual thought or freedom of action, denying the subordinate the right to behave in accordance with their own ethical principles. 2. The level of taxonomic classification of organisms below the class, and containing one or more families. For example, primates and rodents are orders within the class Mammalia. (See SPECIES, TAXONOMY) (MP)

**ORGAN:** (Greek: *organon* "tool", from *ergon* "work") The structural and functional unit of the body, an organ is any well-defined body part consisting of fully differentiated specialist cells and adapted to a certain biological purpose (e.g. brain, liver, skin). 2. Informally, "organ" may refer to the penis. (MP)

**ORGAN DONATION:** Donation of body organs with the intention that they be replaced into the body of another. The donation of some organs can come from living donors while for many organs it is possible only after death. (See BRAIN DEATH, ORGAN TRANSPLANTATION).(DM)

**ORGAN TRANSPLANTATION :** Surgery of removing a solid organ /tissue or partial detachment of a part of the body and implantation of the same organ in a different region of the same body or different individual. Four types: Autograft - using one's own tissue for grafting. E.g. A cock's claw transplanted to its comb region; Isograft, Syngeneic graft. Existence of genetic identity between the donor and recipient; Allograft, also termed homograft, the donor and the recipient are members of the same species. Xenograft, also termed as heterograft (Hetero = other than self) , the donor and recipient are of different unrelated species E.g. Human and Pig, (See XENOTRANSPLANTATION). (JA)

**ORGANELLE:** A structure in the cytoplasm of a cell that is specialized in its ultrastructure and biochemical composition to serve a particular function (e.g. mitochondria, endoplasmic reticulum, chloroplast). (DM)

**ORGANIC CHEMISTRY:** A major branch of chemistry which investigates carbon compounds. Carbon has the ability to bond covalently with itself, as well as with other molecules like hydrogen, oxygen or nitrogen, to form varied and extensive branched chains or rings. Carbon compounds are fundamental to all currently existing earthly life, but not restricted to living matter as believed in the nineteenth century when the term "organic chemistry" was coined. Conversely, it is theoretically possible that not all life must be based on organic chemistry. "Carbon chemistry" is perhaps a more technically accurate alternative. (See BIOCHEMISTRY, LIFE) (MP)

**ORGANIC COMPUTER:** See MOLECULAR COMPUTER.

**ORGANIC FARMING :** Agriculture without use of artificial pesticides, chemical fertilizers, artificial hormones, or, according to some, genetically modified organisms. In some countries or districts, what food may be labeled as organic is regulated by statute. Farming of organically grown foods usually attempts to minimize human additives. (See PERMACULTURE) (RW, MP)

**ORGANISM :** A living being. (RW)

**ORGANIZATIONAL POLICIES :** Positions on issues taken by groups such as professional and voluntary health associations. (DM)

**ORGANOGENESIS** : See EMBRYONIC PERIOD.

**ORGANOIDS**: Artificial matrices are being made to perform the functions of organs, such as for release of hormones in the body. Usually living cells will be enclosed within the matrix. (DM)

**ORGANOPHOSPHATES** : Phosphorus-based pesticides which, like the chlorinated hydrocarbons, are dangerous and persistent organic pollutants. (See PERSISTENT ORGANIC POLLUTANTS, CHLORINATED HYDROCARBONS) (MP)

**ORGASM**: the climax of sexual excitement and pleasure during which ejaculation occurs in the male and vaginal contractions in the female. The female orgasm may be repeated several times if stimulation is continued (Greek *organ* to grow or swell). (IP)

**ORGY**: (Greek: *orgia* "secret rites", from *ergon* "work") An orgy is a no-holds-barred sexual party involving casual interaction and intercourse between multiple partners in a group setting, usually with food and perhaps intoxicants such as wine. Relatively rare today because of modern taboos, the orgy is considered by some as an example of the decadence and self-indulgence which may have contributed to the fall of the Roman Empire. Nevertheless, there is nothing bioethically wrong with honest sexual indulgence so long as all participants and their primary partners are consenting. (See SWINGING, OPEN MARRIAGE) (MP)

**ORIENTAL**: (Latin: *oriens* "rising" in reference to the dawn sun). "Orient" is a poetic term for East, as well as the act of aligning one's own position with reference to the compass, surroundings or point of view. Oriental culture, or the Orient, PHILOSOPHY, OCCIDENTAL) (MP)

**ORIGIN OF LIFE**: The origin of life on Earth is still a mysterious and contentious issue. The majority of the world believes in creationism, the conscious design of life by God as described in religious texts such as the Bible. Creation may be interpreted as the design of currently-existing fully formed organisms, as an initial "setting loose" of early replicators to evolutionary forces, or as a process of constant creative co-existence with the world. Perhaps the most probable scientific theory is the "primeval soup" theory, first formulated by Russian biochemist A. I. Oparin in his 1936 *The Origin of Life on Earth*, and eloquently described in **Richard Dawkins'** *Selfish Gene*. Life may have evolved from the interaction of reducing hydrogen-rich gases of the atmosphere dissolved in primordial oceans of non-biologically produced organic chemistry. Under the action of lightning and ultraviolet radiation, simple molecules were transformed into the fundamental organic molecules of living matter. Evidence of such processes has been demonstrated under laboratory conditions, with scientists able to spontaneously create complex organic molecules in a test tube, including amino acids, pyrimidines and purines such as adenine, one of the four bases of the DNA molecule. Nucleic acids (DNA and RNA molecules) may constitute the best molecular mechanism for accurate intergenerational transmission, with replication mistakes in fewer than one base in  $10^8$  -  $10^{12}$ . The replicator is the basis of life, simply a molecule with the property of being able to create copies of itself using materials from the surrounding chemical soup. Once replicators begin competing with one another for such resources, the process of evolution by natural selection is sufficient to explain increasing complexity of these molecules up to and including modern organisms. Two other scientific theories for the origin of life are also worth mentioning. One is the "inorganic mineral" theory proposed by Graham Cairns-Smith in which the original replicating entities, clay-like crystals such as silicates, acted as a scaffold for the later emergence of DNA. Another possible theory is that the building blocks of life may have had extraterrestrial origin, arriving on Earth in ice from impacting comets. (See LIFE, EVOLUTION, CREATIONISM, NATURAL SELECTION, ALIEN LIFE, ARTIFICIAL LIFE) (MP & IP)

**ORIGINAL SIN**: A view in Christianity founded by Augustine, in which sin is held to be innate to all humankind. Inherited guilt and propensity to sin are carried through to all direct descendents of Adam and Eve, who ate from the tree of knowledge against divine command. (See SIN) (MP)

**ORNAMENTAL PLANTS:** Plants selected for their beauty or appearance rather than food. (DM)

**ORNITHOLOGY:** (Greek: *ornis* "bird" + *logos* "reason") The scientific study of birds and bird life. Ornithologists study the physiology, ecology, behavior and classification of birds. (MP)

**OSMOSIS:** The passage of water through a semi-permeable barrier such as a cell membrane. Water tends to flow from a hypotonic fluid (with low osmotic concentration) to hypertonic fluid (higher relative osmotic concentration) until an isotonic medium (equilibrium) is reached. (See MEMBRANE) (MP)

**OTA:** Office of Technology Assessment of the USA.

**OUTER SPACE TREATY:** Multilateral treaty signed in 1967 obliging nations not to place nuclear weapons into orbit. (See SPACE WARFARE, NUCLEAR NON-PROLIFERATION, MISSILE DEFENSE) (MP)

**OUTLIER:** In statistics, a measurement which lies in an unusual or extreme location compared to the other measures in the data set. Sometimes outliers are assumed to be errors and removed, but in a few cases they may indicate extra information such as vagrant individuals outside of their ecological range. (See ERROR, NOISE) (MP)

**OUTPATIENT COMMITMENT :** Legally mandated outpatient treatment of the mentally ill. (DM)

**OVARIES:** Paired female sex glands in which ova are developed and stored and among many others the female steroid hormones estrogen and progesterone are produced. (DM)

**OVERDEVELOPED NATIONS:** Overdeveloped in this context means *material* development; excessive energy use, resource consumption, waste generation, and expenditure on damaging technologies. Overdeveloped nations waste their excess wealth, and feign unawareness of external misery. These countries should begin (and can afford) moves towards humanitarianism, philanthropy, environmental economics, deconsumerism and dematerialization. Material overdevelopment implies a certain *philosophical* under-development in terms of sustainability, peace, precaution, opportunity cost, biodiversity conservation, social equity, human rights, ethics and empathy. (See DEVELOPED NATIONS, FIRST WORLD, CONSPICUOUS CONSUMPTION, SUFFICIENCY, SUSTAINABLE DEVELOPMENT, DEMILITARIZATION, DEMATERIALIZATION) (MP)

**OVERSPECIALIZATION:** See MULTIDISCIPLINARY, INTEGRATED MANAGEMENT.

**OVERWORK:** See WORKAHOLISM AND KAROSHI.

**OVIDUCT:** Fallopian tube.

**OVUM (pl. ova):** The female egg or oocyte, formed in an ovary.

**OVUM DONOR:** A woman who donates an ovum or ova to another woman.

**OXYGEN:** (See OZONE DEPLETION, RESPIRATION)

**OXYMORON:** Oxymoron is a strange word used to describe a self-contradictory phrase where the words making up the two halves are seemingly opposite, but still manage to make sense in combination. Typical examples include ‘sustainable development’, ‘military intelligence’, ‘smart bomb’. (See PARADOX, EUPHEMISM) (MP)

**OZONE :** (Greek: *ozein* 'to have an odor'). A highly reactive form of oxygen consisting of three atoms, O<sub>3</sub>. Ozone is formed naturally when oxygen is present in an electric discharge, as occurs in a lightning storm. Due to its high reactivity ozone is also used in many industrial processes as an oxidizing agent in bleaching, cleaning and related processes. In the troposphere, ozone reacts with other pollutants to produce smog and free radicals that damage the health of humans and other organisms. In the stratosphere, an ozone layer shields the Earth's surface from UV, which would otherwise damage DNA in living things. (See OZONE HOLE; STRATOSPHERE; TROPOSPHERE). (IP+RW)

**OZONE HOLE :** In common idiom describes human-driven stratospheric ozone layer depletion. The stratospheric ozone serves as a shield to absorb harmful ultraviolet radiation in the stratosphere, protecting living organisms on the Earth from the effects of excessive amounts of such radiation. Under normal equilibrium conditions, the quantity of ozone in the stratosphere is at steady-state levels resulting from balanced production and destruction. However, industrial activities have emitted a variety of atmospheric pollutants, especially chlorofluorocarbons (CFCs), that have significantly accelerated the destruction of stratospheric ozone in Polar Regions with the consequent thinning of this protective shield. The most prominent instance of ozone layer destruction is the so-called Antarctic Ozone Hole, which refers to the region of the Antarctic stratosphere where ozone is depleted by 50 to 75% in winter and early spring. Increasing ground-level ultraviolet radiation seriously reduces photosynthetic production and causes other ill effects on organisms. (See OZONE, GREENHOUSE EFFECT). (IP+RW)

**OZONE LAYER :** See OZONE HOLE.

**OZONE SHIELD :** See OZONE HOLE.

## P

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**PACIFISM:** Pacifism is non-violence, or harmlessness. Pacifism has had a long tradition in Buddhism, Taoism, Jainism, Christianity, Anabaptists, Quakers, Contractarianism, International Federalism, hippy culture, civil rights, green and peace movements. It is heartbreaking to note that many of the world’s most famous pacifists, such as Jesus Christ, Mohandas Gandhi and Martin Luther King Jr., were OBJECTOR)

(MP)

**PAIN:** Unpleasant physical or mental sensation. It is not always easy to tell if another entity is in pain and the difficulties increase as the dissimilarities between the entities increase. For example, can fish feel pain? Fish can't scream or grimace in the ways that we can when in pain. However, they do show analogous physiological changes to those shown by humans when placed in situations where we might anticipate them feeling pain. (See SUFFERING.) (MR)

**PALEOANTHROPOLOGY :** Paleontology is a discipline of science that deals with the study of fossils and fossil remains of plants, animals and humans. Anthropology is a discipline of science that deals with the study of human beings. Paleoanthropology is the study of fossil remains of human beings, both pre-human and human beings. (JA)

**PALEOINDIANS:** Some anthropologists and archaeologists call the first Asians (Mongoloids) that entered the American continent during the Upper Palaeolithic period, Paleoindians. These are the ancestors of the Amerindians. Accordingly, the first migration is also called the paleoindian migration, followed by the Na-Dene and Aleut-Eskimo waves of settlement. This model is very controversial, and recent genetic studies as well as archaeology/anthropology indicate that the colonization of the American continent has been much more complex. Still, the very early occupants of the continent are called Paleoindians. (GK)

**PALEOLITIC AGE** the archeological age beginning about 750,000 years ago characterized by the hunter-tribal period of human cultural development. (IP)

**PALEONTOLOGY:** (Also British: palaeo- from Greek: *palaios* "ancient" + *ontology* "existence") The scientific study of fossils and their context. The paleontologist uses remnant clues to reconstruct information about ancient life forms and past environments. (MP)

**PALI CANON:** See TIPITAKA.

**PANDORA :** See HOPE.

**PANTHEISM :** Pantheism is a philosophy, which says that God is everywhere, everything is identical with, or at least a part of God, nothing exists except for God. Pantheism can be regarded as a form of atheism, in the sense that pantheism says that God is nothing but the world. But Pantheism can be regarded as an extremely religious idea in that it says that the world is nothing but an appearance of God. Spinoza (q.v.), was perhaps the most famous pantheist philosopher. Some people call him an atheist. But the American philosopher, William James, called him: "that God-intoxicated man." Israeli Kabala ("Jewish mysticism"), which says that everything in the world is a revelation of Godliness, is a form of pantheism. Another famous pantheist was Parmenides of Elea (5<sup>th</sup> Century BC) in ancient Greece. (FL)

**PAP SMEAR TEST:** a smear test of examining stained cervical cells for the presence of cancerous ones (named after George N. Papanicolaou, Greek physician in US practice 1883-1962). The technique permits early diagnosis of cancer and has significantly contributed to lowering the death rate from cervical cancer; thus, is an important part of general gynecological care (see CERVICAL CANCER). (IP)

**PARADIGM:** A paradigm is an archetypal pattern or theoretical framework which supports scientific and metaphysical beliefs. Thomas Kuhn in his *Structure of Scientific Revolutions* (1962) sees the progress of science not as gradual like the empiricists, but as a series of punctuated

changes, or 'paradigm shifts', which alter the very model and language of the previous belief system. The 'dominant paradigm', or established viewpoint, is overthrown by an alternative epistemological framework or world-view. One of Kuhn's examples was the paradigm shift from the Ptolemaic earth-centered picture of the solar system to the Copernican ALTERNATIVE PARADIGM, KNOWLEDGE, META-KNOWLEDGE) (MP)

**PARADIGM CASE:** The 'paradigm case' is a dominant representative example of something, and the 'paradigm case argument' is a philosophical refutation of skepticism. (See PARADIGM) (MP)

**PARADIGM SHIFT:** Punctuated revolution of scientific knowledge and/or community belief with new ideas or discoveries. Changes in fundamental worldview or viewpoint do not come easily, and individuals ahead of their time (on the other side of a paradigm shift) may initially suffer institutional ridicule (examples include James Lovelock, Noam Chomsky and Eric Drexler). The dominant paradigm has the collective weight of inertia, tradition and professional careers invested in its maintenance. Institutional resistance will persist until the models and language of the previous belief system are updated to the alternative paradigm. (See ALTERNATIVE PARADIGM) (MP)

**PARADOX :** A seemingly contradictory situation, problem or statement. (RW)

**PARALLEL UNIVERSES THEORY:** The potential simultaneous existence of "ghost" universes other than our own, a theory developed since the 1950s to explain quantum and relativity paradoxes such as the collapse of a quantum wave function. Universes within the "multiverse" may also be connected by "wormholes", a term coined by John Wheeler, maybe with daughter universes able to bud off from the parent universe through a black hole singularity. A parallel universe would be similarly populated by stars and galaxies, perhaps even a near-duplicate of our own universe including humans. It has been even more speculatively proposed that all possible courses of action exist across an infinite number of parallel universes. This is of course non-testable conjecture, but if it were true it would have peculiar repercussions for ethical philosophy. (See QUANTUM THEORY, HOLOGRAPHIC UNIVERSE THEORY) (MP)

**PARAMETER:** 1. A boundary or limiting factor to thought or action, for example: "technology should be developed within the parameters of bioethical debate". 2. In maths it may be an independent variable in an equation whose constancy allows investigation of the other variables. 3. In statistics it refers to a descriptive measure of a population, as distinct from a statistic which is derived from a sample and is only an estimate of the parameter. (See STATISTIC, SAMPLE) (MP)

**PARAMETRIC STATISTICS:** Statistics which assume the normal distribution. (See NORMAL DISTRIBUTION, PARAMETER) (MP)

**PARANORMAL PHENOMENA:** (Greek: *para* "beyond") Observations or claimed experiences which are not within the range of normal experience and therefore not explainable by science or logic. The progress of science may eventually explain some paranormal phenomena, however more likely the unexpected progressions of technology will attempt to simulate the paranormal and perhaps successfully "normalize" some. (See PARAPSYCHOLOGY, EXTRASENSORY PERCEPTION, CLAIRVOYANCE, PRECOGNITION, PSYCHOKINESIS, STIGMATA, TELEPATHY, TELEPORTATION) (MP)

**PARAPSYCHOLOGY:** (Greek: *para* "beyond" + *psych* "mind" + *logos* "science"). The branch of psychology concerned with psychic phenomena such as clairvoyance and telepathy. (MP)

**PARASITE:** (Greek: *parasitos* "guest"). A symbiotic association in which one organism lives in or on another and takes nourishment at the expense of this host organism. Parasites make up the bulk of the organisms on earth, since each non-parasite is usually host to a multitude of parasite species. Examples of parasitic symbionts of humans include lice, fleas, roundworms, tapeworms, protists, bacteria and fungi. (See SYMBIOSIS, COMMENSALISM) (MP)

**PARENTAL CONSENT :** Informed consent given by a parent on behalf of a minor or otherwise legally incompetent child. (DM)

**PARENTAL NOTIFICATION :** For medical treatment of legal minors, in many jurisdictions the parents need to be notified. It is a contentious issue in some states regarding the age for parental notification for abortion decisions in pregnant teenagers. (DM)

**PARSIMONY:** (Latin *parsimōnia* 'sparingness') Simplicity and least number of requisites and assumptions; economy or frugality of components and associations. In philosophy of theories the principle of parsimony is known as 'Ockhams Razor'. (See OCKHAMS RAZOR, SIMPLICITY) (MP)

**PARTHENOGENESIS:** Egg cells develop into an individual organism without the input of the sperms from the male organism. Parthenogenetic stem cells in nonhuman primates have been artificially induced to undergo the early stages of development with the contribution from the sperm ( *Science*- 1.2.2002). It occurs naturally under some conditions in birds. (JA, DM).

**PARTHENOGENOTE :** See HUMAN PARTHENOTE.

**PARTICLE GUN :** A tool in getting through fragments of DNA through the cell membrane into the a cell. Ultra thin tungsten metal particles (fractions of a micrometer) are mixed with DNA and fired at a very high speed into a cell using a 0.22 cartridge. (See BIOLISTIC AND BIOLISTIC GUN). (JA)

**PASSIVE EUGENICS:** See EUGENICS.

**PASSIVE EUTHANASIA :** See EUTHANASIA.

**PASSIVE SMOKING :** the inhalation by nonsmokers of other people's smoke. Research indicates that exposure to upper and lower respiratory tract diseases thdiac events. Pregnant women exposed to other people's smoke are also more likely to deliver a low birtMOKING, SUDDEN INFANT DEATH SYNDROME, XENOBIOTIC). (IP)

**PASTORAL CARE :** Counseling or comfort given by members of the clergy to patients in stressful situations. (DM)

**PATENT:** A legal monopoly right tenable for a limited period of time, given to an inventor, an invention filed with a patent office detailing ones invention. A patent is a grant issued by different government through a Patent and Trademark Office that gives the patent owner the right to exclude all others from making, using, or selling a patented invention within the country for the term of the patent (e.g. in the USA this is for 17 years). Fulfillment of one of the criteria, namely details about the patent must be fully disclosed, can enable others and provides incentives to improve the process or develop alternative methods. The patenting system enables commercial enterprisers to invest in the production and application of knowledge by allowing the benefits to be accrued to the company.



There are about three essential categories: 1. A product patent which deals with the product (a chemical or a biological entity, a substance or composition) *per se* . It also covers its practical uses. It would cover an active ingredient. 2. A process patent – a patent on the methodology or the process by which a product is produced. It would cover the actual making of the ingredient or its formulation. 3. A use patent – it covers the specific practical use of a product for a specific purpose. It would cover a specific pharmaceutical product for a specific medical ailment. An application usually has three sections: 1. An abstract - gives the summary of the application. 2. Description – a detailed description of the invention as to ensure the reproducibility of the same by another skilled person. 3. Claims – a detailed statement over which rights are asserted. All claims must be self explanatory in the sense it must be clear and complete. (See PATENT CRITERIA). (DM+JA)

**PATENT CRITERIA** : In order to issue a patent, following criteria are considered. The claim for the invention must be eligible for patenting, 1. It must be novel, 2 it must be inventive or non obvious 3. It must be useful or have an industrial application, 4.it must be fully disclosed in the patent application. A mere discovery does not merit patenting . (JA).

**PATENTING LIFE**: Many patent offices have expanded patent rights to encompass not just microorganisms but gene sequences, expressed sequence tags (ESTs), proteins, cell lines, genetically modified plants and animals and even non genetically modified species. As on Nov 2002 6,000 patents on full length genes from human, animal, plants, bacteria and viral sources have been awarded, besides 20,000 gene patents. It is estimated that life patents cover 5,00,000 different molecular structures. There has been considerable controversy about patenting of life and genetic material. (JA, DM)

**PATERNITY TESTING** : In certain disputes involving multiple sex partners, a woman may declare that the father of her child is not her husband, then DNA identification is carried out. DNA fingerprinting is used in Paternity Testing. It involves legal questions like "support obligations". (JA)

**PATERNAL NOTIFICATION** : Informing the father. It is a contentious issue in some states regarding the question of whether paternal notification is required for legal abortion decisions by the mother. (DM)

**PATERNALISM**: The system of action in which one person treats another the way a father treats a child, striving to promote the other's good even against the other's wishes. The setting of limits on individual autonomy in an effort to benefit, or to prevent harm to, the person whose autonomy is limited . (DM)

**PATHOGENIC**: Able to cause disease; often utilized to express inactivation or lethality. (DM)

**PATIENT ACCESS TO RECORDS** : Access by patients to their own medical, genetic, or other health-related records. (DM)

**PATIENT ADMISSION** : Acceptance of a patient by a hospital or other health facility. (DM)

**PATIENT ADVOCACY** : Promotion and protection of the rights of patients by an institutionally-appointed or self-designated person or group. (See PATIENTS' RIGHTS). (DM)

**PATIENT CARE** : Includes medical and nursing care. (DM)

**PATIENT CARE TEAM** : A multidisciplinary team in which each member of the team has specific responsibilities and the whole team contributes to the care of the patient (DM)

**PATIENT COMPLIANCE** : Cooperation of the patient in following a prescribed regimen. (DM)

**PATIENT TRANSFER** : Interfacility transfer of patients, usually for economic reasons. (DM)

**PATIENT RECORDS**: The medical records of patients. In some countries patients have a legal right to view them, and in others they do not. (See PRIVACY). (DM)

**PATIENTS' RIGHTS** : Fundamental claims of patients, as expressed in statutes, declarations, or generally accepted moral principles. (DM)

**PAX**: 1. Latin: *pāx* ‘peace’, or a binding together by treaty, associated with *pacīscī* ‘to agree; pact’. 2. A sacred item blessed by a Roman Catholic priest. 3. A colloquial appeal for truce or ceasefire. (See PEACE, PAX AMERICANA) (MP)

**PAX AMERICANA**: The ‘American Peace’, or peace imposed by the dominance of the U.S.A. (post World War II); from language of the Roman Empire (Latin: *pāx* ‘peace’), and in the lineage of *Pax Romana* (first centuries bce ), *Pax Ecclesiastes* (first centuries) and *Pax Britannica* (nineteenth century). (See PAX, PEACE) (MP)

**PCBs**: See POLYCHLORINATED BIPHENYLS.

**PCP** : See PHENCYCLIDINE HYDROCHLORIDE.

**PCR**: See POLYMERASE CHAIN REACTION.

**PEACE**: (Latin: *pax* , French: *pais* , Spanish: *paz* , Arabic: *salaam* , Hebrew: *shalom* ) Peace is not just an absence of war. Peace is the absence of any violence, hostility, threats, force, civil strife, conflict, bad intentions, mental disturbance or negativity. Peace is the presence of unity, agreement, security, sufficiency, calm, tranquility, freedom and wellbeing. (See UNITY, UNITED, PACIFISM, NON-VIOLENCE, PEACE KEEPING, SALAAM, SHALOM, SHANTI, AHIMSA, TRANQUILITY) (MP)

**PEACE BUILDING**: Strategies that create conditions which address the causes of conflict (pre-conflict peace building) and ensure non-recurrence of violence (post-conflict peace building). Methods include preventive diplomacy, peace making, arms control, dispute resolution, conflict analysis, and the introduction of democratic institutions and economic restructuring. Scientific analysis of international conflict uses quantitative methods to predict war-prone dyads (e.g. study of alliances, arms races, capability balance), war-prone states (e.g. national economic and political organization), war-prone regions (regional patterns, population pressure, contagion), and war-prone systems (heterogeneity, polarity etc). Prevention and peace building measures must include meeting people’s requirements for identity and quality of life, and using the ‘soft power’ of an ethically persuasive value system. (See PEACE, PEACE MAKING, PEACE MOVEMENT, PREVENTIVE DIPLOMACY, PREVENTIVE DEPLOYMENT, FACILITATION, DISARMAMENT, SOFT POWER, DOVE) (MP)

**PEACE ENFORCEMENT**: As well as ‘Peace Keeping’ mission, the United Nations in 1992 added ‘Peace Enforcement’, ‘Preventive Deployment’ and ‘Peace Building’ options to iteace enforcemeon in Kuwait, 1992-3 UNPROFOR in Bosnia-Herzegovina and 1993 UNOSOM II intervention in Somalia. The differences between peace enforcement and war are perhaps in the justification for war ( *Jus ad bellum* ), but should also be in its conduct ( *Jus in bello* ). (See JUST WAR THEORY, PREVENTIVE WAR, PEACE KEEPING, PEACE BUILDING, AGGRESSOR NATION, SANCTIONS, EUPHEMISM) (MP)

**PEACE KEEPING**: Deployments of military forces to maintain order and control in situations of recent conflict. Limited to self-defense and

non-coercive mandate, peace observers and peace keepers try to establish security and adherence to negotiated agreements, ceasefires and military withdrawals. Peacekeepers also try as best they can to protect civilians and humanitarian workers (e.g. Red Cross, Médecins Sans Frontières), and maintain order on the streets. Deployments may be the distinctive blue-helmeted United Nations troops, or other independently-organized national or multinational forces. The first United Nations peace operation to be deployed is likely still there (UNTSO 1948 in Israel). Other examples of Peace Keeping deployments have included UNGOMAP 1988 for the Soviet withdrawal of Afghanistan, UNIIMOG 1988 for Iran/Iraq, UNTAC 1992 in Cambodia, S-FOR in Bosnia-Herzegovina, and INTERFET 1999 in East Timor. The boundaries between 'Peace Keeping' and 'Peace Enforcement' may be blurred, g in operational practice. (See PEACE, PEACE ENFORCEMENT, PEACE BUILDING, PREVENTIVE DEPLOYMENT, PREVENTIVE DIPLOMACY, CONFLICT RESOLUTION, NON LETHAL WEAPONS) (MP)

**PEACE MAKING:** The use of diplomatic means to negotiate a peaceful settlement and cessation of hostilities, for example dispute mediation by a third country or personality of international standing such as the Secretary General of the United Nations. Peace making uses similar methods as preventive diplomacy, only after conflict has already taken hold. Neutral mediation in combination with facilitators from identifying cultural groups or civilizations may encourage trust and effective communication for negotiation and ceasefire. (See PEACE, PEACE BUILDING, PREVENTIVE DIPLOMACY, MEDIATION, FACILITATION, NEGOTIATION, CONFLICT RESOLUTION) (MP)

**PEACE MOVEMENT:** The peace movement is a worldwide collection of anti-war activists, philosophers of peace, and others committed in opposition to conscription, armed conflict, nuclear technologies, military-industrial complex, violent media, gun ownership, government oppression, terrorism and/or other abuses of human rights. Its ideologies have parallels to varying degrees with green politics, the civil rights movement, socialism, anti-nuclear, anti-globalization, anarchism, preventive diplomacy and peacekeeping. Elements of pacifism and peace activism can be seen for example in some of the words and philosophies of Jesus Christ, Gautama Siddhartha (Buddha), Mahavira, Lao Tzu, Bertrand Russell, Leo Tolstoy, Hermann Hesse, Mahatma Mohandas Gandhi (assassinated 1948), John F. Kennedy (assassinated 1963), Martin Luther King Jr. (assassinated 1968), John Lennon (assassinated 1980), Yitzhak Rabin (assassinated 1995), Princess Diana Spencer (1997), Sergio Vieira de Mello (assassinated 2003), Pope John Paul II, Nelson Mandela, Kofi Annan, Noam Chomsky, Aung San Suu Kyi, and Tenzin Gyatso (Dalai Lama). (See PACIFISM, NONVIOLENT RESISTANCE, CONSCIENTIOUS OBJECTOR, AHIMSA, ACTIVISM, PROTEST, GREEN MOVEMENT, ANTI-GLOBALIZATION MOVEMENT, NONVIOLENT DIRECT ACTION, VIOLENT MEDIA, UTOPIA) (MP)

**PEACE NEGOTIATION:** (See PEACEKEEPING, PEACE ENFORCEMENT)

**PECKSNIFFIAN** a. *Archaic*: a hypocritical parade of benevolence or high principle (after a character in one of Charles Dickens' novels, 1812-70). (IP)

**PEDIGREE** : An structured family tree showing relevant genetic characteristics. Eg. Albinism. (JA)

**PEER REVIEW** : The evaluation by professionals of the quality of work performed by fellow professionals. (DM)

**PENAL SERVITUDE:** Time spent in jail or a penal institution, that may include labour for community good. (DM)

**PENTATEUCH** : The Five Books of Moses, or the first five books of the Hebrew Bible ('Genesis' to 'Deuteronomy'). These books comprise the Torah, central teachings of the Jewish faith. (See TORAH, OLD TESTAMENT) (MP)

**PEOPLE POWER**

**PER ANNUM:** (Latin: 'by the year') A statistic referring to amount per year, e.g. number of births per annum. (MP)

**PER CAPITA:** (Latin: "by heads") A statistic referring to a proportion per person or for each individual; e.g. average annual income per capita. (MP)

**PERCENTILE :** The  $p^{\text{th}}$  percentile is a value such that  $p$  percent of the data take on this value or less. It is a measure that locates values in the data set that are not necessarily central locations. It provides information regarding how the data items are distributed. (JA)

**PERCEPTION:** Human awareness and understanding of the environment, both physical and social, perceived elements and relationships that surrounds them, meaning/importance understood by different groups of people in different times and places. (See SENSES). (JA)

**PERCIVAL, THOMAS**

### **PERFORMANCE INDICATORS**

**PERMACULTURE:** ("Permanent" + "Agriculture"). The design and maintenance of agriculturally productive ecosystems which have the diversity, stability and resilience of natural ecosystems. Permaculture is based on the observation of nature rather than its domination, and allows the co-existence of natural systems within the cultivated agricultural system. Instead of the conventional monocultural practice of "mining the land" of its fertility and ecology for the purpose of providing a single product, permaculture is a combination of ecology, agriculture, forestry, energy, architecture, animal husbandry, traditional wisdom and scientific technology. The term was coined in 1974 by Bill Mollison of Australia and is spreading to become a global grassroots initiative. (See MONOCULTURE, SUSTAINABLE AGRICULTURE). (MP)

**PERMACULTURE ETHICS:** Planning for long-term sustainability by the use of a diverse polycultural mix of species, cultivation of the smallest possible land area, the use of species native to the area, the use of renewable resources and energy, reforestation, the incorporation of subsistence agriculture into urban areas, promotion of self-reliance, community, recycling, reduced consumption, ethical and environmental education. (See PERMACULTURE, POLYCULTURE, SUSTAINABLE DEVELOPMENT) (MP)

**PERSISTENT ORGANIC POLLUTANTS (POPs):** These dangerous chemicals remain in the environment for long periods, are highly toxic in small doses, undergo bioaccumulation, and have been implicated as carcinogens (e.g. breast cancer) and endocrine disruptors (e.g. reduced sperm counts). The "dirty dozen" POPs identified by the United Nations Environment Program (UNEP) include the dioxins, furans, polychlorinated biphenyls (PCBs), DDT, dieldrin, aldrin, endrin, mirex, toxaphene and chlordane, but others also of particular concern include endosulfan, halogenated chemicals and volatile organic compounds such as toluene and benzene. Such poisons must be phased out at their industrial sources to prevent export to the less regulated world, accumulation in the environment or damage to human health. (See POLLUTION, POLYCHLORINATED BIPHENYLS, SYNTHETIC HORMONE DISRUPTORS) (MP)

**PERSISTENT VEGETATIVE STATE :** See PVS.

**PERSONAL PILLS :** Knowledge about the details of Single Nucleotide Polymorphisms (SNIPs) can indicate genetic variations, which may dictate how drugs are prescribed for a particular person. (JA)

**PERSONHOOD :** Descriptively, the status of being self-aware, capable of rational thought and of moral agency; normatively, the status of being accorded moral and/or legal rights. (DM)

**PESSIMISM:** See OPTIMISM .

**PET SCAN:** short for positron emission tomography - a computerized radiographic technique that employs radioactive substances, typically labeled glucose, to examine the metabolic activity of various body structures. The labeled substance is inhaled or injected where it emits positively charged particles which, on combining with negatively charged cellular electrons, result in the creation of gamma rays that are then converted into color-coded images that indicate the intensity of the metabolic activity of the organ, or body part involved. The technology is particularly useful for the study of blood flow, metabolism of the heart, diagnosis of cancer and the biochemical activity of the brain (see MRI). (IP)

**PETROL SNIFFING :** See SOLVENT ABUSE.

**PGD** See PRE-IMPLANTATION GENETIC DIAGNOSIS

**pH:** ("potential of hydrogen") The acid-base measurement, a logarithmic scale across which a pH of 0 is the most acid, pH 7 is neutral, and pH 14 the most basic (alkaline). Pure water is pH 7.0 and blood is about pH 7.4. (MP)

**PHARMACEUTICAL CHEMISTRY :** (Greek *pharmakon* 'drug'). Engaged in the application, composition, preparation and sale of medicinal drugs used in diagnoses and therapies. (See PHARMACOLOGY, PHARMACOPOEIA, DRUG). (IP)

**PHARMACEUTICALS:** See DRUG, PHARMACEUTICAL CHEMISTRY.

**PHARMACOGENOMICS** A term that describes the use of advanced genetic tools to elucidate how variations in patients' DNA may diminish or amplify drug effects or render a pharmaceutical toxic. (JA)

**PHARMACOLOGY :** (Greek *pharmakon* 'drug' + *logos* 'science'). The science of the actions, properties, preparation and uses of drugs on living systems. (See PHARMACEUTICAL CHEMISTRY, PHARMACOPOEIA, DRUG). (IP)

**PHARMACOPOEIA :** (Greek *pharmakon* 'drug' + *poiein* 'to make'). A book listing drugs that describe their standard preparation, recommended administration, clinical uses, toxic effects, and fate (if known) in the body. National pharmacopoeias are published in many countries; for example, the French Codex, European Pharmacopoeia and United States Pharmacopoeia. These reference texts are reviewed regularly. (See PHARMACEUTICAL CHEMISTRY, PHARMACOLOGY, DRUG). (IP)

**PHASE TRANSITION:** See FEEDBACK, CHANGE.

**PhD :** Doctor of Philosophy.

**PHENCYCLIDINE HYDROCHLORIDE :** An anesthetic drug used in veterinary medicine, it is also known as PCP (perhaps from PeaCe-Pill) or "Angel dust" (perhaps from the Hell's Angels), and has been used as an illegal recreational drug since the 1960s. Symptoms include loss of pain response, distortions of perceptions, seizure, ataxia and respiratory depression risking death. (See KETAMINE). (IP+MP)

**PHENOTYPE:** The characteristics of individuals that result from the interaction of their genotypes and their environments. The external appearance of an organism -controlled by genes and environment. (See GENOTYPE). (JA, DM)

**PHILOSOPHY :** *Philosophia*, in Greek, means love of wisdom. The great philosophers, before the nineteenth century, at least, almost always developed their philosophies out of their attempts to grapple with tension between science and spirituality. It is hard to find a great philosopher who was not deeply learned both in science and mathematics, and in the theology of at least one religion. Since philosophy became an academic profession, some professional philosophers still fit this description, but not all do.

One of the greatest of all philosophers was Plato.. Over the gate of his Academy in ancient Athens were the words: "Let no one enter who has not studied mathematics." Philosophy in Plato's day was largely inspired by wonder at the spiritual implications of mathematics. From the 17

<sup>th</sup> Century revolution in physics of Descartes and Newton, through the days of Einstein and Heisenberg, physics was the inspiration of philosophical thought, and those not learned in it might have been forbidden entry to philosophical academies. The sciences, which inspire wonder today, are the health and biological sciences. But only a minority of members of university philosophy departments is learned in health and biological sciences. Nor are a majority of professional philosophers sufficiently learned in the theologies of any religions to grapple adequately with spiritual implications of science. So there is a vacuum. Bioethics is a new, interdisciplinary, co-operative endeavour, which attempts to fill this vacuum by bringing together people from several disciplines (each complementing the others) to grapple with questions of the kinds which philosophers used to address. (FL)

**PHLOEM:** Plant conductive tissue involved in the transport of organic materials. (See XYLEM, PLANTAE) (MP)

**PHOBIA :** (Greek: *phobos* 'fear') Irrational dread or abnormal anxiety resulting from a specific subject or situation. Awareness of the irrationality of the fear is usually not enough to prevent it, and the trigger for the phobic response may spread or generalize in some sufferers. Phobias may arise from repetitive emotional conditioning in childhood or as a result of some specific shocking or fearful event. Predisposition to certain phobias may have been selected for by evolution, but in the modern day most phobias are negative preoccupations maladaptive to normal living. The most commonly existing phobia is social-anxiety disorder; the extreme case of phobia is the panic attack. Phobias may be managed and reduced using cognitive-behavioral therapy involving progressive desensitization to the stimulus of the fear. Examples of specific phobias include fear of pain (algophobia or odynophobia), death (necrophobia), sinning (peccatophobia), nudity (gymnophobia or dishabiliophobia), homosexuality (homophobia), sex (erotophobia or malaxophobia), marriage (gamophobia), childbirth (tocophobia), children (pedophobia), strangers (xenophobia), clowns (coulrophobia), spiders (arachnophobia), germs (mysophobia), crowds (ocholophobia), enclosed spaces (claustrophobia), open spaces (agoraphobia), heights (acrophobia), technology (technophobia) and fear (phobophobia). (See FEAR, ANXIETY, SOCIAL ANXIETY, DESENSITIZATION) (MP)

**PHOTOCHEMICAL SMOG** is a major local or regionalized air pollution phenomenon characterized by oxidants, irritants, and visibility-obscuring particles occurring in urban areas where the combination of pollution-forming emissions, sulfur dioxide from vehicle exhaust for example, and atmospheric conditions are suitable for its formation. Photochemical smog is highly injurious to health and quality of life. Photochemical smog has a long history, for example, in 1542, Juan Rodriguez Cabrillo named San Pedro Bay in southern California "The Bay of Smokes" because of the heavy haze that covered the area (see NUCLEAR WINTER). (IP)

**PHOTON:** A quantum of electromagnetic radiation; the smallest indivisible unit, or "particle", of light, having zero charge and inertial mass. (See QUANTUM) (MP)

**PHOTOSYNTHESIS** literally "synthesis out of light" - metabolic processes carried out by green plants where water and carbon dioxide is synthesized to form oxygen and organic compounds such as ATP and glucose. The process is enabled by trapping the energy from sunlight. (See RESPIRATION, AUTOTROPHS, BIOGEOCHEMICAL CYCLE). (IP)

**PHRENOLOGY :** A study that predicts the faculties and qualities of mind using the shape of the skull. (JA)

**PHYCOLOGY:** (Greek: *phukos* "seaweed" + *logos* "reason") The scientific study of algae, including physiology, ecology and environment. (MP)

**PHYLOGENY:** (Greek: *phulo* "tribe" + *geny* "birth") The sequence of events in the evolutionary development of a species or other taxonomic group. (See ONTOGENY) (MP)

**PHYLUM:** (Greek: *phulon* "race") The second highest level of taxonomic classification of organisms below the kingdom, and containing one or more classes. For example Phylum Arthropodia (including insects and crustaceans) or Phylum Chordata (including all vertebrates). (See SPECIES, KINGDOM, TAXONOMY) (MP)

**PHYSICAL MAP:** A map of the locations of identifiable landmarks on DNA (e.g., restriction enzyme cutting sites, genes, RFLP markers), regardless of inheritance. Distance is measured in base pairs. For the human genome, the lowest-resolution physical map is the banding patterns of the 24 different chromosomes; the highest-resolution map would be the complete nucleotide sequence of the chromosomes. (DM)

**PHYSICAL POLLUTION :** See POLLUTION.

**PHYSICAL PROCESS SUSTAINABILITY:** See SUSTAINABLE MANAGEMENT.

**PHYSICAL RESTRAINT :** Use of a device for the purpose of preventing an individual from moving all or part of the body . (DM)

**PHYSICIAN:** (Greek: *physis* 'nature'). A health professional who has completed a Doctor of Medicine (M.D.) degree. Interestingly, the ancients saw the physical laws ( *physikos* meaning natural) of the universe and the work of physicians inseparably interconnected. From our perspective, reflecting on the ancient thesis of the unity of all things, we are again confronting modern physics. Thus, physician and physics can be seen as a metaphor - the body that must be healed is united with the immensity of the cosmos of which it is a part. (See PHYSICS; PLACEBOS). (IP)

**PHYSICS:** (Greek: *physikos* "natural") The scientific study of matter and energy, their interrelations and the physical properties of the universe. Physics is based on mathematics and its natural laws, forces and processes are fundamental to the other sciences. Branches of physics include mechanics, thermodynamics, optics, acoustics, electromagnetism, nuclear physics, particle physics, solid-state physics, astrophysics and quantum mechanics. (See CHEMISTRY) (MP)

**PHYSIOLOGICAL ECOLOGY:** See ECOPHYSIOLOGY.

**PI:** The fascinating number denoted by the Greek letter  $\pi$  (pi), 22 divided by 7, or 3.14159... and on to an infpi by radius squared to get area. An example of chaos, and of simple rules embedded in complexity. (See CHAOS, COMPLEXITY, STATISTICS) (MP)

**PIDGIN :** A pidgin is a mixed tongue which develops between neighbors or trading partners speaking different languages, for example 'pidgin English'. A creole is a pidgin which has matured to become a localized mother tongue. Pidgins have limited grammar and vocabulary resulting from their makeshift origin, but are creatively adaptive expressions never to be stereotyped as the result of 'primitive' thought processes. (See LINGUA FRANCA, ARTIFICIAL LANGUAGES) (MP)

**PILOT STUDY:** An initial study carried on a small sample, to explore the subject and identify requirements for design of the main study or experiment. (See SCOPING, EXPLORATORY RESEARCH, BASELINE MONITORING, EXPERIMENT) (MP)

**PLACEBOS** : Biologically inactive substances used for their psychological effect in patient care or as control agents in research. The word *placebo* is Latin for 'I will please', and refers to any procedure administered solely to gratify a patient's desire for treatment. Since the therapy is scientifically ineffective, its efficacy is realized by self-governance or reliance on an authority figure (doctor, spiritual healer, Shaman) for getting well. Therefore, an alternative meaning of *placebo* has to do with the way in which a patient 'pleases' by involving the doctor (or surrogate) as the therapeutic agent in the process of getting well. The placebo effect, as measured in a variety of modern studies, has been estimated to range from 21% to a remarkable 58%, depending on the disease, the placebo, and the way the study was executed. (See CLINICAL TRIALS; PHYSICIAN). (DM+IP).

**PLACENTAL MAMMAL**: see EUTHERIAN MAMMAL

**PLAGUE** : Bobonic plague killed between 17 and 28 million during the years 1347 to 1350, i.e. one third of Europe. Japanese attempted to use it as a biological weapon on Chinese during World War II with the loss of some human lives on both sides. (JA)

**PLANCK, MAX** : (1858-1947). German Physicist. Planck's work on the laws of thermodynamics and black body radiation moved him away from classical Newtonian principles, opening up the way for original innovative thinking. In 1900 Planck proposed the quantum theory for which he received, in 1918, the Nobel Prize for physics. (See QUANTUM THEORY; CLASSICAL MECHANICS; NEWTON, ISAAC; EINSTEIN, ALBERT). (IP)

**PLANKTON** : The collection of organisms that float in the water; planktonic organisms float or swim more slowly than typical currents. (RW)

**PLANNED OBSOLESCENCE**: Integral features of a product known by the manufacturer to wear out or become superfluous, ensuring regular return custom for replacements or updates. This is typical for computer and software technology which supersedes itself at a fast rate. Planned obsolescence and in-built redundancy protect commercial values only at the expense of both environmental and social values. (See CONSPICUOUS CONSUMPTION, WASTE) (MP)

**PLANT BREEDING**: The development of plants with certain desirable characteristics, such as disease resistance. (DM)

**PLANT VARIETY**: Cultivated plants that are clearly distinguishable from others by one or more characteristics, and that when reproduced retain those distinguishing characteristics. (DM)

**PLANT VARIETY PROTECTION**: Patent-like protection for certain sexually produced plants. Plant variety protection is granted by many countries, and applies within those countries. It only applies if the holder ensures a reasonable commercial supply of that variety to all who want it. (DM)

**PLANTAE**: Plantae are the plants, one of the five taxonomic kingdoms along with Animalia, Fungi, Protista and Monera. Plants are autotrophic organisms with chloroplasts which manufacture energy directly from the sun through photosynthesis. They have rigid cell walls and reproduce on a variation of the alternating diploid sporophyte and haploid gametophyte life-cycle model, with increasing emphasis on the sporophyte stage through evolution. Members of the kingdom Plantae include algae (green, red, bluegreen, macro-algae), bryophytes (mosses, liverworts), ferns, tracheophytes (vascular plants) and Spermatophytes (seed plants; gymnosperms and angiosperms). Plant communities form the basis of habitat structure and ecological energy procurement, and include phytoplankton, seaweeds, seagrasses, mangroves, deciduous forest,



sclerophyll forest, coniferous forest and tropical rainforest. (See PLANT VARIETY, AUTOTROPHS, PHOTOSYNTHESIS, ANGIOSPERM, GYMNOSPERM, HABITAT, ALGAE, SEAGRASS, MANGROVE FOREST, DECIDUOUS FOREST, SCLEROPHYLL FOREST, CONIFEROUS FOREST, TROPICAL RAINFOREST, EUTROPHICATION, REFORESTATION, TREE PLANTING, POLYCULTURE, PERMACULTURE) (MP)

**PLASMID:** An extrachromosomal, circular piece of DNA found in the cytoplasm and capable of replicating and segregating independently of the host chromosome. See *vector* . Found in cytoplasm of bacteria and in some eukaryotes. R-plasmids are those that carry gene for drug resistance and Col - plasmids that carry the gene for producing a protein, known as Colicins, conjugal plasmids transfer their properties to other members of the population, non-conjugal are non transmissible in nature. (DM, JA)

**PLASTIC SURGERY :** See COSMETIC SURGERY.

**PLATO** (428-7 - 348-7 BC): Pupil of Socrates and teacher of Aristotle, Plato is famous for his many literary-philosophical dialogues in which Socrates is given the central role. He believed that this world is a not-very-good copy of the world of *forms* or *ideas*, where the true archetypes of things exist. In his *Republic*, he advocated a rather regimented society in which people would be educated to live ethical ways of life, and to perform functions according to their class. Karl Popper, in his *Open Society and its Enemies* depicted Plato's Republic as the model of the closed society.

Over the entrance to Plato's academy was a warning that people who had not studied mathematics were not welcome to enter. This was long before the days in which academic learning was separated into *humanities* and *sciences* , and in which people could become "professional philosophers" without having studied mathematics or the sciences. Bioethics, which raises ethical and spiritual questions as a consequence of studies in mathematics and the sciences, is a return to the interdisciplinary philosophical tradition for which Plato's Academy stood. (FL)

**PLEASURE:** (Old French: *plaisir* "to please") An enjoyable sensation or emotion which arouses delight or happiness. Common positive sources of pleasure include love, friendships, recreation, relaxation, productivity, personal and financial success and security. However, some religious philosophy has been interpreted to condemn pleasure-seeking in an attempt to avoid greed, excess, selfishness and self-indulgence. Certain means of satisfying the human drive for pleasure have associated costs and ethical boundaries, for example inappropriate or overconsumed resources, material possessions, food, drink, drugs, sex, money, trivial amusements, theft, revenge or other harmful behaviours. A sense of balance must be developed and avenues for pleasure-seeking must be bounded by our ethics and the consequences of our actions. (See JOY, HAPPINESS). (MP)

**PLEBISCITE:** A referendum to allow people to vote directly on an issue or policy of relevance to their lives. (See REFERENDUM) (MP)

**PLEIOTROPIC EFFECT:** The production of several unrelated changes in the characteristics of a cell or organism by a single genetic change. (DM)

**PLURIPOTENT :** Cells capable of differentiation into any type of organs or cell type. (See STEM CELLS). (JA)

**PLUTONIUM (PU) :** (Planet *Pluto* ). A highly toxic synthetic waste product of nuclear power plants. Plutonium, discovered in 1940, is a transuranic metallic element which is produced by the collision of a neutron with uranium; thus, it is formed in uranium fuel rods in nuclear

reactors. Plutonium is itself an extremely efficient source of nuclear energy so it can be extracted from used fuel rods for re-use in a different type of nuclear reactor. The process whereby more nuclear fuel is produced than is used is called 'breeding' and the reactors employed are known as 'fast-breeder reactors'. Plutonium was used in the assembly of early nuclear weapons. (See ATOM BOMB, NEUTRON BOMB). (IP).

**PO:** A word coined by Edward de Bono as a lateral-thinking tool to counter-force the 'No' of logical thinking. 'Po' i. It has some of the feel of *possibility*, by *po* thesis sup *po* se and *po* tent, but rather opens up spaces 'outside of reason', a 'holiday from the usual conventions of logic', therefore more in the spirit of *poetry*. Po has not been the most successful of memes, but still has an intangible persuasiveness. (See LATERAL THINKING) (MP)

**POACHING :** Poaching is unauthorized hunting or capture of animals, for example illegal fishing, hunting outside the appropriate season, or taking wildlife from private property or National Parks. Large amounts of illegal African ivory, skins and other animal products have been ceremoniously destroyed in the war against poaching. In some countries, poaching of charismatic and threatened species is crime enough for rangers to have a shoot-first policy for poachers. Regulatory and consumer action must be maintained against products containing animal parts, for example Asian tiger, rhino and seahorse 'aphrodisiacs'. (See HUNTING) (MP)

**POISON :** (Latin *potio* 'drink'). Any substance that when ingested, inhaled or absorbed into the body in small amounts destroys life or injures health. Poisons may act by rapid action or become damaging after repeated exposure. Clinically poisons are categorized into those that respond to specific treatments and those for which there are no specific treatments available. (See TOXIN, TERATOGEN, POISON HEMLOCK). (IP)

**POISON HEMLOCK :** *Conium maculatum* is a biennial plant found in wastelands and moist soils in the eastern US and on the Pacific coast. It has large, compound umbels of small, white flowers that appear from June to August. Poison hemlock contains an alkaloid toxin that makes it a dangerously poisonous plant that has sometimes been used for sedation and analgesia. In classical times it was a standard method of executing convicted criminals - Socrates being the best known of its victims. Unintentional poisoning has taken place when the seeds were mistaken for anise, the leaves for parsley and the roots for parsnip. Legend tells us that even blowing a whistle made from the hollow stem can cause fatal poisoning. (See BUSH MEDICINE, HERBALISM, POISON, TOXICOLOGY, SOCRATES). (IP)

**POLICY ANALYSIS :** Indicates that the document contains substantive argumentation concerning moral and/or public policy. (DM)

**POLITICAL ACTIVITY :** Actions by individual citizens or by interest groups, designed to influence government policies. (DM)

**POLITICAL CORRECTNESS:** See DEBATE.

**POLITICAL REFUGEES:** See REFUGEES.

**POLITICS :** Actions by government officials or bodies in the development of public policy. (DM)

**POLLUTANT** Any chemical/solid/liquid/gaseous substance/suspended particulate matter released into the environment and are present in such concentrations that may cause or induce deleterious environmental condition or to organisms or tend to be injurious to human beings. Any substance that is categorized as wastes specified by a competent authority and included in a Schedule appended to a specific rule/government order. (JA)

**POLLUTION :** Any undesirable change in the physical, chemical or biological characteristics of air, land and water with a possibility to harm

organisms/human beings/cultural assets/industrial process/living conditions. Physical pollution include noise (undesirable sound) pollution, genetic pollution include man made alteration in the gene sequence that may go out of control at a later stage; cultural pollution include undesirable social change. Introduction by humans, directly or indirectly, of substances or energy into the environment (including air, water, soil etc.). Often resulting in such deleterious effects as harm to living resources, hazards to human health, hindrance to activities including agriculture, fishing, impairment of quality for use of water and reduction of amenities (See GESAMP). (JA)

**POLLY** : Transgenic cloned sheep, produced from a cell line of genetically modified foetal cell culture by Roslin Institute and PPL-Therapeutics, expressing a human protein in its milk. (JA)

**POLYCHLORINATED BIPHENYLS OR PCBs** are synthetic, chemically stable industrial compounds used 1. as hydraulic fluids, flame retardants, dielectric fluids for capacitors and transformers 2. As organochlorine insecticides methoxychlor, kepone and DDT, as well as a number of closely related chlorinated hydrocarbons such as chlordane, dieldrin, endin and heptachlor used in aerial crop spraying, and numerous other products. PCBs are in a class collectively known as "hormone disruptors" because they mimic naturally-occurring steroid hormones such as estrogens and testosterone, and interfere with thyroid and adrenal gland metabolism. They resist the body's natural detoxification processes so accumulate in the body's fat deposits (see Biomagnification) and have been document to be an important factor in rising infertility rates in humans (see SYNTHETIC HORMONE DISRUPTORS & DDT). (IP)

**POLYCULTURE**: (Greek: *polys* "many" + Latin: *cultura* "cultivation") The agricultural cultivation of a range of intermingled mixed crops. This diversity allows for stability in the face of environmental change, and enables the cohabitation of a wider biodiversity of native species. (See MONOCULTURE, PERMACULTURE) (MP)

**POLYGAMY** [Gr. *poly* : many + *gamos* : marriage] a breeding system in which an individual acquires more than one mate. In polyandry, a female mates with more than one male, in polygyny, a male mates with more than one female. (IP)

**POLYGENIC DISORDERS**: Genetic disorders resulting from the combined action of alleles of more than one gene (e.g., heart disease, diabetes, and some cancers). Although such disorders are inherited, they depend on the simultaneous presence of several alleles, thus the hereditary patterns are usually more complex than those of single-gene disorders. Compare *single gene disorders* . (DM)

**POLYMERASE**: An enzyme that assembles a number of similar or identical subunits into a macromolecule (e.g. DNA polymerase and RNA polymerase). (DM)

**POLYMERASE CHAIN REACTION (PCR)** - a technique for the rapid amplification of a specific nucleic acid sequence contained in a stretch of DNA. (DM)

**POLYMORPHISM**: Difference in DNA sequence among individuals. Genetic variations occurring in more than 1 percent of a population would be considered useful polymorphisms for genetic linkage analysis. Compare MUTATION. (DM)

**POLYPLOID**: Having a chromosome number that is greater than two of the monoploid number. Polyploid oysters were among the first non-naturally occurring, non-human, multicellular, living organisms to be declared patentable subject matter. Multiple chromosome sets in the nucleus are common in plants, but rare in animals. Eg. Triploid, tetraploids. (DM, JA)

**POMOLOGY** : Science of growing fruits (JA)

**POPPER** , Sir Karl Raimund: (1902-1994) Born in Austria. One of the most famous philosophers of science of the 20<sup>th</sup> Century. Popper rejected inductive 'proof' in science and emphasized that scientific ideas must be falsifiable. (RW)

**POPs:** See PERSISTENT ORGANIC POLLUTANTS.

**POPULATION:** Strictly a collection of individuals within a **SPECIES** (q.v.) that forms an interbreeding group. However, the term is often used simply to mean a number of individuals within a species found in a common area. People also talk about world human population size, which probably reached six billion ( $6 \times 10^9$ ) in the year 2000 at which time it was increasing by about 80 million a year. (MR)

**POPULATION CONTROL:** Regulation of the growth and distribution of people in a country or region. (DM)

**POPULATION DENSITY:** The number of individuals of a species per unit of land area occupied by that species, for example people per square kilometre. The measure should exclude land unsuitable for habitation, such as rugged mountains, deserts or other inappropriate habitats. (See POPULATION DISTRIBUTION) (MP)

**POPULATION DISTRIBUTION:** The location, range and extent of occupation of a population or species. The arrangement of a population may be measured by its extent of occurrence, which is the area within the boundary encompassing all known or inferred sites of occurrence, excluding vagrant individuals. It may also be more accurately measured using the area of occupancy, which is the sum of appropriately sized grid squares occupied by the species, thereby excluding unsuitable habitat within its extent of occurrence. (See POPULATION, POPULATION DENSITY) (MP)

**POPULATION EXPLOSION:** In most species the number of individuals in a POPULATION (q.v.) can increase rapidly, i.e. undergo a 'population explosion' at times when there is an excess of food and other factors necessary for successful reproduction. (See EXPONENTIAL) (MR)

**POPULATION LIMITS:** See LIMITING FACTOR and LIMITS TO GROWTH.

**PORNOGRAPHY:** lascivious art or literature. The Greek word *porne* or harlot first appeared in the 7<sup>th</sup> Century BC and is derived from the ancient verb *pernimi* to sell (Greek *porne* whore + *graphein* write/draw). (IP)

**POSITIVE DISCRIMINATION:** See AFFIRMATIVE ACTION.

**POSITIVE EUGENICS:** The achievement of systematic or planned genetic changes to improve individuals or their offspring. (DM)

**POSITIVE FEEDBACK:** See FEEDBACK.

**POSITIVISM** The form of positivism best known today is Logical Positivism, a philosophy developed by a group called the Vienna Circle, who met regularly in Vienna from the 1920's until they fled the Nazis in the late 1930's. Their philosophy is presented in a readable form in A.J. Ayer's clear and classic book, *Language, Truth and Logic*. The Logical Positivists sought to rid our language of nonsensical talk, which they believed derived from religion and fanatic ideologies. In fact the movement may have been at least in part a reaction against the ideologies of nationalism, fascism, and Nazism, which were prevalent in Europe at that time. They decreed that a statement is meaningful if, and only if, it is either analytic or empirically verifiable. By "analytic" is meant a statement, which can be proved to be true by the methods of logic or mathematics. By "empirically verifiable" is meant provable or falsifiable, by direct sense observation, or by the methods of laboratory science. It should be noted that a false statement, like "The Eiffel Tower is in Tokyo", is just as meaningful as a true one. Statements, which are

neither analytic nor empirically verifiable, were called: "Strictly speaking, nonsense." Statements of religion, spiritualism, etc, were deemed nonsensical by the Logical Positivists. So were statements of ethics. The statement: "This is red", is meaningful because red is an observable property. But the statement: "This is bad" is not meaningful because bad is not an observable property. We can observe a murder, for example. And we might observe all sorts of colours, smells, sounds, etc. But *bad* is not one of the things, which we observe. (The reasoning was taken from David Hume) But although the positivists believed that statements of ethics have no meaning, they allowed that they have a use. Their use was in expressing emotions. This was called the "emotivist" theory of ethics.

Since ethical statements were considered meaningless, it became no longer acceptable in some circles for philosophers to say anything about what is good and what is bad. The job of philosophers became to "analyse" what other people say when they make ethical statements. In professional language, philosophers stopped engaging in *ethics*, and started to engage in *metaethics*. The distinction is the forerunner of Macer's discussions of *prescriptive* and *descriptive* bioethics. (FL)

**POSITIVITY:** Positivity is an expression of enthusiasm, optimism, good cheer, acceptance, tolerance and love. Most things have elements of both good and bad, people have strengths and weaknesses, there are pros and cons to every decision or change - positivity is a general focus on the good aspects. Experimental studies have looked at the beneficial effects of positivity on the longevity of relationships. Using an index of positive and negative comments made during a single 15-minute discussion of an issue of dispute between newly-weds, a study successfully predicted over 90% of marriage breakups over a ten year period. Positive thinking also has benefits to health, business and self-perception. So don't worry, be happy, look on the bright side of life, see the glass half full, notice the good in people. (MP)

**POSITRON EMISSION TOMOGRAPHY:** See PET SCANS.

**POST- :** Prefix denoting 'after' in space or time. (See PRE-, INTER-, TRANS-) (MP)

**POST TRAUMATIC STRESS DISORDER :** Exceptionally harsh treatment can trigger a 'last resort' biological ailment in children and forms part of the 'collateral damage' of systematic human activity and emotions in order to channel all available energy to staying alive. This adaptation involves the stress response - the so called 'fight or flight' mechanism - thinking of the barriers, however, only of the siege syndrome in CATION SYNDROME; STRESS; INSTITUTION OF WAR; COLLATERAL DAMAGE). (IP)

**POSTHUMOUS REPRODUCTION** giving rise to offspring after one's death; that is, from gametes or embryos that have been collected and stored frozen during life or soon after death. For example, using sperm from a deceased male to fertilize *in vivo* (donor insemination) or *in vitro* in conjunction with ICSI technology (see ASSISTED REPRODUCTIVE TECHNOLOGY). (IP)

**POSTNATAL BLUES :** See POSTPARTUM BLUES

**POSTNATAL DEPRESSION :** a mood disorder which usually begins insidiously some weeks postpartum and is characterized by feelings of inadequacy and overwhelming sadness. The condition strikes approximately one in ten mothers and is of considerable severity as it is not a temporary loss of emotional control and cannot be simply attributed to hormonal instability. Surveys indicate that the women most likely to suffer postnatal depression are women who have delayed having children until their careers are established and who have had little contact

with other mothers or support from their families. Nutritional deficiencies due to the heavy demands of pregnancy and breast-feeding, alcohol, smoking and other stresses may be contributing variables. Counselors urge new mothers to ask for help from their partner, family and friends as, ideally, parenting is not a single responsibility but one to be shared among those close to the mother and her baby. (See POSTNATAL PSYCHOSIS, POSTPARTUM BLUES, DEPRESSION). (IP)

**POSTNATAL PSYCHOSIS** : psychiatric illness after childbirth has been observed and documented since its description by Hippocrates in 400 BCE, and is a severe mental illness of mostly unknown etiology which can lead to violence such as suicide, child neglect and abuse. Fortunately, the condition is uncommon but still affects an estimated 1 in every 1,000 deliveries. Typically, the mother suffers illness of such severity that hospitalization with full psychiatric control is necessary to assure her safety and/or the safety of her infant. (See POSTNATAL DEPRESSION, POSTPARTUM BLUES, DEPRESSION). (IP)

**POSTPARTUM BLUES** : short periods of mild depression and mood swings which quickly return to normal but affect up to 80% of women any time between 2 and 5 days after the birth of their babies. Sleep deprivation, extra demands of the offspring and the re-establishment of the non-pregnant endocrine balance can all induce this condition in otherwise healthy women. In one theory, mild depression is attributed to the sudden removal of circulating  $\beta$ -endorphin - produced by the hypothalamus. A modern reanalysis of this theory, is not a new western invention. (IP)

**POT** : See MARIJUANA.

**POTENTIAL HEALTH RISK** : any harm either physical or psychosocial/ psychological damage to a person due to a scientific, technological and medical application. It may also include disclosure of genetic information and other medical records of a person which may cause a possible damage in familial relationship and other social stigmatization and discrimination. (JA)

**POWER ANALYSIS**: See STATISTICAL POWER.

**PPM** : Parts Per Million.

**PRAGMATISM**: Actions which are based upon immediate practicalities rather than any theoretical considerations. In philosophy, pragmatism implies that the truth or content of a concept lies in its practical applicability or coherence with experience rather than theory. (MP)

**PRAISE**: (Latin: *pretium* "prize") An expression of admiration, commendation or gratitude to a person or deity. Positive encouragement of praiseworthy behavior is held in higher regard than attempts to educate using criticism or condemnation. (MP)

**PRAYER**: (Latin: *prex* ) A personal communication or communion with God or another deity, often ritualized prayers of devotion but also often also a respectful request or entreaty to divinity. Prayer is a central focus of religious institutions and places of worship, aided by prayer books, beads and prayer wheels. For many people prayer provides a fundamental connection to their spiritual support and sense of identity. However, in a bioethical situation such as a sick child, prayer is an addition not an alternative to practical action. (MP)

**PRE-** : Prefix denoting 'before' in space or time. (See ANTE-, POST-, INTER-, TRANS-) (MP)

**PRECAUTION:** (Latin: *praecavere* "before + beware") An advance action, cautious circumspection or safeguard to protect against potential dangers or undesirable events. Accidents, uncertainty and unpredictability are factors leading to environmental damage and loss of life, and professionals in positions of power must take ethical responsibility for the future by exercising precaution. (See PRECAUTIONARY PRINCIPLE) (MP)

**PRECAUTIONARY PRINCIPLE:** An important modern concept for ecological, political and corporate management, the precautionary principle effectively states that *"Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation"* (1992 Australian Intergovernmental Agreement on the Environment). Lack of full scientific knowledge of impacts should not be used as an excuse for development, with the onus of responsibility on the developer. Threats of irreversible environmental damage should be considered guilty until proven innocent. The principle of caution involves leaving ecological space as room for ignorance. All efforts should be taken to prevent non-sustainable development, habitat destruction or degradation, release of chemicals into the environment, global climate change, and loss of biodiversity. It is a useful tool to flag ignorance and uncertainty about eventualities such as undesirable ecological, social or corporate impacts, and to hold policy until increased scientific understanding of a problem has been achieved. The precautionary principle should be especially considered in environmental impact assessment, risk analysis, hazard management, political diplomacy and the scientific development of dangerous knowledge or technology. Many believe that the principle should become an established guideline for all policy-makers. (See PRECAUTION, ENVIRONMENTAL IMPACT ASSESSMENT, RISK ANALYSIS, HUMAN EXTINCTION). (IP & MP)

**PRECISION:** Precision is the correspondence of a measurement or repeated measurements within close specified limits. In mathematics, the precision of a number may be expressed as its power of 10. It is possible for a measurement to be precise but inaccurate. (See ACCURACY) (MP)

**PRECOGNITION:** (Latin: *prae* "before" + *cognoscere* "know") Prior knowledge of the occurrence of a specific event, for example a death revealed in a dream state, with no reasonable explanation for that awareness. One rationalization is that regular false expectations tend to be forgotten, whereas the occasional random precognitions which turn out to be true are noticeable and are remembered. (See CLAIRVOYANCE) (MP)

**PRECONCEPTION INJURIES :** Injuries to offspring attributed to damage sustained by either parent before the start of pregnancy. (DM)

**PREDESTINATION:** See DETERMINISM.

**PREEMBRYO:** The developing cells produced by the division of the zygote before the formation of the embryo proper at the appearance of the primitive streak. Also called pro-embryo. (DM)

**PRE-EMPTION:** Action in anticipation of the likely or possible action of another. (See GAME THEORY, PRE-EMPTIVE STRIKE, PREVENTIVE WAR) (MP)

**PRE-EMPTIVE STRIKE:** An early or surprise offensive attack, designed to prevent anticipated terrorism or military actions before the threat has actually materialized. It relies however upon a 'reaction' to the 'possible' intentions of another, which cannot necessarily be known, especially in a hawkish climate of fear or distrust. Pre-emptive strikes put conflicts on a hair-trigger, precipitating vengeance and a 'use it or lose it' mentality. (See PREVENTIVE WAR, HAWK, AGGRESSOR NATION) (MP)

**PREFRONTAL CORTEX:** See FRONTAL LOBE .

**PREGNANCY :** (Latin *praegnans* 'pregnant'). The gestational period between fertilization and the complete delivery of the fetus, placenta and fetal membranes, or the period between fertilization and the interruption of pregnancy as by spontaneous or induced abortion. A human pregnancy lasts approximately 36 weeks from the day of conception but is generally calculated 40 weeks from the first day of the last menstrual period. During the period of growth and development of the embryo and the fetus many physiological and psychological changes take place. (IP)

**PREIMPLANTATION GENETIC DIAGNOSIS (PGD)** A genetic technique that allows a single cell to be taken from an embryo in vitro in order to detect certain serious genetic conditions, before implantation. (see also GENETIC DIAGNOSIS) (JA)

**PREIMPLANTATION SCREENING :** See PREIMPLANTATION GENETIC DIAGNOSIS.

**PREMARITAL TESTING :** Premarital testing has been developed as a way to prevent genetic anomalies without recourse to abortion or discontinuation of neonatal intensive care. The idea seems to work most efficiently in groups, like some Orthodox Jewish sects, where prearranged marriages are the rule. One organisation, *Dor Yesharim* , started testing potential matches for Tay-Sacks several years ago. Privacy is guaranteed. If neither, or only one person is a carrier, they simply inform the families that they have no objection to the match, without mentioning which, or whether either person is a carrier. If both are carriers, they inform the families that they do not recommend the match. Among modern young people, where the rule is love marriages, rather than arranged marriages, it can be a subject for hot debate in the university classroom, whether a couple who have fallen in love, would cancel a wedding because of genetic test results. (FL)

**PREMATURITY :** inadequate birth weight due to preterm delivery where the duration of pregnancy was less than 37 weeks rather than poor fetal weight gain for a given duration of pregnancy which is conveyed as intrauterine growth retardation. (See INTRAUTERINE GROWTH RETARDATION). (IP)

**PREMISES:** Statements or evidence used to support an argument or conclusion. (See ASSUMPTIONS) (MP)

**PRENATAL DIAGNOSIS :** Determination of fetal status prior to birth. Methods include alpha-fetoprotein screening, amniocentesis, chorionic villi sampling. (See FETAL THERAPY, GENETIC SCREENING, PRENATAL SCREENING, PREIMPLANTATION DIAGNOSIS, SEX DETERMINATION) (GK)

**PRENATAL SCREENING:** See PRENATAL DIAGNOSIS.

**PREPUCE:** Technical name for the foreskin, or retractable fold of skin across the tip of the penis which is removed during circumcision; also the hood of skin protecting the clitoris. (See CIRCUMCISION) (MP)

**PRESIDENT'S COMMISSION:** The President's Commission was a body set up in the United States in the 1970s to deliberate on bioethical issues, and laid out a number of fundamental reports on bioethics issues. (DM)

**PRESSURE / STATE / RESPONSE MODEL:** A model often used by OECD countries in State of the Environment (SoE) reporting. It follows a causal relationship from the pressures which impact upon the state of the environment through to the development of adaptive responses. Driving forces may include population change, economic production, international trade, consumption trends, and flows of energy and materials. Pressures on the environment include energy use, agriculture, industry, developments and other human activities. State or



condition of the environment is measured and reviewed, with reference to impacts upon land, air, water, biodiversity, ecology and human environments. Response requires close links to institutional policy, legislation, management decision-making, new technology, economic policies, international obligations and changing value systems. (See STATE OF THE ENVIRONMENT REPORT, ENVIRONMENTAL IMPACT ASSESSMENT) (MP)

**PRESUMED CONSENT** : An institutional policy of granting authority to health personnel to perform procedures on patients or to remove organs from cadavers for transplantation unless an objection is registered by family members or by the patient prior to death. (DM)

**PRESYMPTOMATIC GENETIC TESTING** : The genetic status of a person can be predicted with much certainty. A presence or absence of a gene (monogenetic) can cause a disorder. Testing of genetic disorder due to a single gene is often referred to as "presymptomatic genetic testing". Primarily carried out in healthy or asymptomatic individuals to provide information about that individual's future health, with respect to specific inherited diseases. Such a test result may indicate that the testing is most frequently used in late onset autosomal dominant disorders such as Huntington's Disease. (JA)

**PREVALENCE** : The number of cases of a given disease in a specified population at a designated time. (DM)

**PREVENTION**: See CURE.

**PREVENTIVE DEPLOYMENT**: The field deployment of peacekeeping troops for containment, deterrence and to maintain peace and order in an area of probable emerging conflict. For example, Macedonia was protected by a UN Preventive Deployment Force during the 1992 Yugoslav conflict. Distinction should be made between preventive deployment requested by the relevant government, pleaded for by affected people, and that which may be unwelcome. (See PREVENTIVE DIPLOMACY, PRE-EMPTION, PEACE ENFORCEMENT, PREVENTIVE WAR, PEACE KEEPING) (MP)

**PREVENTIVE DIPLOMACY**: Peace maintenance strategies and action to prevent disputes from escalating into armed conflict and to prevent the spread of conflicts, for example the United Nations in association with regional governments and organizations. Peaceful means for preventive diplomacy include mediation, negotiation, enquiry, arbitration and judicial settlement. Early prevention is the provision of a dispute resolution service well before armed conflict becomes imminent. Further information can be found in the UN Secretariat's 1991 *'Handbook on the Peaceful Settlement of Disputes between States'*. (See PREVENTIVE DEPLOYMENT, PEACE BUILDING, PEACE MAKING, FACILITATION, MEDIATION, NEGOTIATION, CONFLICT RESOLUTION) (MP)

**PREVENTIVE MEDICINE** : The branch of medicine concerned with the prevention of disease and the promotion and preservation of health. (DM)

**PREVENTIVE WAR**: Euphemistic term for offensive military action based on temporary strategic advantage and the presumption of putative intentions. Preventive war is generally considered illegal under international law unless backed by United Nations Security Council resolutions. An example of so called 'preventive war' was the 2003 invasion of Iraq by the US 'coalition of the willing', on the supposed basis

of preventing the link between terrorism and weapons of mass destruction. (See PRE-EMPTIVE STRIKE, AGGRESSOR NATION, PREVENTIVE DEPLOYMENT) (MP)

**PRIMARY HEALTH CARE** : Health care provided by the professional who is a patient's initial contact with the health care system and who may refer the patient to a specialist. (DM)

**PRIMER**: A short piece of DNA that promotes DNA synthesis by providing a site for the action of the enzyme, DNA polymerase, to add nucleotides at one end of the primer. (DM)

**PRIMATES** : A highly intelligent group mammalian animals belong to the order Primates with highly convoluted cerebral hemispheres, includes lemurs, lorises, monkeys and apes. It includes also *Homo sapiens* . (JA)

**PRIMITIVE STREAK**: A piling up of cells on the caudal end of the embryonic disc, providing the earliest evidence of the embryonic axis and the formation of the embryo proper. In human embryos this begins to occur at about day 15. It is a progenitor of CNS. It is a boundary for embryo experiments to be allowed up to 14 days prior to streak development. (DM, IP)

**PRIMORDIAL GERM CELL**: precursor reproductive cells in an embryo or fetus. (JA)

**PRIMUM NON NOCERE**: 'Above all do no harm'. A principle widely cited in MEDICAL ETHICS (q.v.) that is stronger than DO NO HARM (q.v.). (MR)

**PRINCIPLE OF DOUBLE EFFECT** : See AQUINAS.

**PRIONS**: Were first proposed by Stanley Prusiner in 1984. They consist of an infectious protein which multiplies by converting normal protein molecules into infectious forms by inducing the normal, benign molecules to change their shape which makes the altered protein, now a prion, resistant to protease breakdown in brain tissue. As a result, plaques and gaps form in the infected person's brain giving Prion diseases the collective name of Spongiform Encephalopathy (see BOVINE SPONGIFORM ENCEPHALOPATHY). The formation of plaques in the brain of infected individuals leads to decline in cognition and motor function and, ultimately, death. The misfolding of a normal protein into a Prion can be caused by a number of factors which include a) iatrogenic (e.g. CREUTZFELDT-JAKOB DISEASE), 2) inherited 3) spontaneous mutation in individual's genome. (IP)

**PRIOR ART**: That which is already known or available, part of the criteria of obviousness used in evaluating patent applications. (DM)

**PRIORITY ANALYSIS**: (MP) (See STRATEGIC MANAGEMENT)

**PRISONER'S DILEMMA**: A 'game theory' examining only one concept? Broadly ME THEORY) (MP)

**PRIVACY** : Freedom from unauthorized oversight or observation. (DM)

**PRIVILEGED COMMUNICATION** : In law, a confidential statement made to a lawyer, physician, pastor, or spouse, which is privileged against disclosure in court if the privilege is claimed by the client, patient, penitent, or spouse. (DM)

**PROBE**: A sequence (DNA, RNA, oligo or cDNA) labelled with a radioactive or fluorescent compound that is used to detect a particular sequence in a mixture of nucleic acids. The probe hybridises specifically to its complementary nucleic acid sequence in the mixture, if this sequence is present. Being labelled, the target-probe duplex becomes visible, and can be recorded either as a +/- (for present/absent) signal in a

dot or slot format, or as a band with a precise size in an autoradiography of a gel. Probes are mainly used to detect mutations and polymorphisms in DNA, or gene expression and transcript sizes in RNA. (GK)

**PROBLEM:** See OBSTACLE, OBJECTIVES, PROBLEM SOLVING.

**PROBLEM FINDING:** See PROBLEM SOLVING.

**PROBLEM REPRESENTATION:** See PROBLEM SOLVING.

**PROBLEM SOLVING:** See PROBLEM, DECISION SUPPORT SYSTEMS.

**PROCESS:** (Latin: *processus* 'proceed') A serrough procedures (e.g. planning, project implementation). 'Process' also has related meanings: 'due process' is adherence to legal proceedings; 'processing' is a certain treatment in manufacturing and photography; and computers 'process' or mantcomes.P)

**PRO-CHOICE :** The persons who believe that a woman has a right to determine whether to have an abortion. (see ABORTION, PRO-LIFE). (DM)

**PRO-LIFE:** The persons who believe that a woman should not have an abortion because it is killing a human life, the fetus. (see ABORTION, PRO- CHOICE). (DM)

**PROCREATION:** According to the French population geneticist Albert Jacquard, the process by which two individuals give rise to a third one, by mixing up half of each one's genome, should be called procreation, meaning that a different being is created from two originally dissimilar sources. Instead, the process by which as offspring, should be called reproduction, indicating that the genetic pool has not been modified from one generation to the next. In the actual bioethicalin the understanding of the biological and societal implications of reproductive issues. (GK)

**PRODUCT PATENT :** See PATENT.

**PROCESS PATENT :** See PATENT.

**PROFESSION:** An occupational grouping consisting of experts with specialized skills or knowledge, organized to perform a service to society as well as maintain standards, communication and training within its own ranks. Professionals function as representatives of a field of knowledge in the interests of a society which deserves professional codes of conduct and ethical standards of practice. (See EXPERT, STANDARDS OF PRACTICE, ENVIRONMENTAL CODE OF CONDUCT) (MP)

**PROFESSIONAL:** See EXPERT.

**PROFESSIONAL COMPETENCE :** The ability to perform the duties of one's profession with an acceptable degree of skill. (DM)

**PROFESSIONAL ETHICS :** Moral principles that apply to professional groups other than physicians and nurses. (DM)

**PROFIT MOTIVE:** See MOTIVATIONS, VESTED INTERESTS, ETHICAL INVESTMENTS.

**PROGESTERONE:** See ESTROGEN.

**PROGRAM :** A complete set of instructions to a computer written in an encoding language. These instructions, together with the data on

which the instructions operate, enable the computer to perform a wide variety of problem-orientated tasks. Some common programs used for scientific and technical purposes are FORTRAN, ALGOL, BASIC AND PL/1. (See COMPUTER, DATA PROCESSING, DEBUG). (IP)  
**PROGRAMED CELL DEATH:** See APOPTOSIS.

**PROGRESS:** From the Latin for 'move forward', progress is advancement; completion of stages in a process; similar to 'development' used to mean 'modernization' gradual improvement of the human condition; or a forward pathway such as a person's progress through life. Modern ideas of progress are based in ancient Greek philosophy has a good implication, so progress supplies the means to happy humans and ecIndex and State of the Environment Reporting. Despite dramatic progress in science rs. (See DEVELOPMENT, MODERNIZATION, GROWTH, DEMILITARIZATION, DEMATERIALIZATION, STANDARD OF LIVING, GENUINE PROGRESS INDICATOR) (MP)

**PROGRESSIVE:** Progressive politics is a liberal leftist persuasion in opposition to conservative politics. Progressivism advocates equality, equity, ethics and human progress. Progressive philosophers of politics have included John Dewey, William James and Theodore Roosevelt. (See PROGRESS) (MP)

**PROKARYOTE:** Cell or organism lacking membrane bound, structurally discrete nucleus and subcellular compartments. Bacteria are examples. Compare EUCARYOTE. (DM)

**PROLONGATION OF LIFE :** The use of therapeutic measures to prevent or delay the death of critically or terminally ill patients . (DM)

**PROOF:** Proof is notoriously difficult to achieve, which is why science is based more on falsification (indirect proof) than proof itself. Indirect proof follows the logic of finding the opposite of the proposed assertion and showing that *not* to be true (rejection of the null hypothesis). Direct proof is deductive, for example when known premises form a valid argument. Legal systems 'prove' a defendant guilty only with the qualification 'beyond reasonable doubt'. There must be some co of uncertainty inherent in most forms of 'proof'. (See FALSIFICATION, CAUSATION, VALIDATION, VERIFICATION, ASSUMPTION, NULL HYPOTHESIS, UNCERTAINTY) (MP)

**PROPAGANDA:** English use of the word was an adaptation of its Italian origins (New Latin: *Sacra Congregatio de Propaganda Fide* "Roman Catholic Sacred Congregation for Propagating the Faith"). Propaganda today refers to the spread of an "official" system of belief, including manipulation of the media and organized dissemination of information with the aim of damaging or assisting a particular political cause. The ease and extent to which the public mind can be swayed by personality and mass media was amply demonstrated for example by the Hitler Youth. But although propaganda brings to mind the fascist and communist extremes of the political spectrum, dictatorships have less need for internal propaganda than do capitalist democracies which are much more controlled and concerned by public opinion. The titles of Noam Chomsky's "*Necessary Illusions*" and "*Manufacturing Consent*" refer to this paradox. Effective, difficult-to-notice methods of massaging public opinion include tacit assumptions, selective choice of focus, and omissions of certain information. Although themselves perhaps subject to similar accusations, Chomsky and Edward Herman's works in the fields of politics and media provide a necessary andarily on a) concentrated, profit-oriented media ownership, b) advertower-relationship effectively exchanges a positively biased (or at le masses from

excesses of human nature there may always be a need for transparency and freedom of information can help expose those on the brink of ethical boundaries. (See CULTURE JAMMING) (MP)

**PROPERTY RIGHTS** : It is a right of ownership of a property. Recently the question of considering genes and DNA sequences as a property or as an asset, have been debated. Or genes and genomes should be considered as our (human) common heritage. If genes are public property (common heritage) then it should be public ally owned. (See PATENTS, GENE PATENTS). (JA)

**PROPRIETARY HEALTH FACILITIES** : Health care facilities (including diagnostic centers and clinical laboratories) that are privately owned and that operate on a for-profit basis. (DM)

**PROPRIETARY HOSPITALS** : Hospitals that are privately owned and that operate on a for-profit basis (in US English). (DM)

**PROSTITUTE** : As a verb, the word means to allow oneself to be exploited or taken advantage of, usually for money, for professional advancement, for security, etc. As a noun, it usually refers to women who provide sex for pay: "sex workers". In ethical discussion, it is often pointed out that sexual prostitution is really no different ethically than other forms of prostitution. Examples are publishing or teaching things that you do not believe, for the sake of professional advancement, or even working at any employment which one does not love or believe in. Indeed, working at a job, which one does not believe in may be a more serious case of prostitution, in the strict sense of the word, than doing sex work if one loves it.

Sexual prostitution is less ethically problematic in itself than are the evils, which may accompany it. It is a vehicle for sexually transmitted diseases. Women are tricked into addiction to hard drugs in order to make them easy sex slaves. Young girls in some countries are still sold into prostitution, and child prostitution is an international problem. Young women from poor countries are enticed to migrate to rich countries for "employment". But when they arrive they find that they must work as prostitutes, and have no other way to pay off their travel debts and "agent's commission" and return home. Legalising prostitution and instituting strict public health and social supervision might alleviate these problems. But powerful religious conservatives might block any attempt to legalise prostitution in many countries. A two-tier reform might therefore be considered. In order to placate religious conservatism, prostitution would remain illegal. But strict public health and social supervision would also be instituted. The punishment for prostitution would be a small, nominal fine. But the punishment for failing to submit to STD examinations, for failing to observe other STD preventive measures, or for the various human rights violations, would be huge and accompanied by a mandatory term in prison. (FL)

**PROTECTION**: A sanctuary is declared by a human decree, which gives protection from human exploitation of natural resources and biodiversity. It prohibits human activity, which can destroy the natural ecosystem. (JA)

**PROTECTED AREAS**: A type of ecoprotection of a particular geographically defined area which is designed or regulated and managed to achieve specific conservation objectives which covers all kinds of situations. There are about 30,000 protected areas worldwide covering 8.83 % of the surface of the earth. (JA)

**PROTEIN**: A large molecule composed of chains of smaller molecules (amino acids) in a specific sequence; the sequence is determined by the sequence of nucleotides in the gene coding for the protein. Built by 2 or more amino acids linked by polypeptide chain, CONH bonding, can be hydrolyzed. They are a major constituent of all living organisms. Eg. Muscle, enzymes (not all enzymes are proteins). Proteins are

required for the structure, function ( e.g neurotransmitters ) and regulation of the body's cells, tissues and organs, and each protein has a unique function. Examples are hormones, enzymes and antibodies. (DM, JA)

**PROTEIN ENGINEERING:** Modification of the amino acid structure or the tertiary features of proteins (e.g. carbohydrate chains) with the purpose of modifying the functions of the proteins. (DM)

**PROTEOME:** hybrid term - PROTEins expressed by a genOME - applicable to industrial protein science describing the proteins expressed by a particular genome or tissue. Traditionally, proteins were examined one at a time; nowadays proteome systems can examine them *en masse* making accessible the temporal and spatial expression of proteins in biological systems, how they're processed and modified, and how they interact to form functional complexes in a tissue or cell. The term "proteome" was introduced in 1994 by Australian scientist Marc Wilkins (see PROTEOMICS, GENOMICS). (IP)

**PROTEOMICS:** the term was first introduced into the scientific literature in 1995 to define the total protein complement of a genome and has become an integral part of gene-expression analysis. Proteomics concentrates on the separation and purification of many proteins concurrently from a complex mixture of proteins. While it had its origins more than 20 years ago, proteomics is a major technology now because of advances in protein science. Separation into pure molecules is typically done on a 2-dimensional matrix followed by identification and characterization by mass spectrometry. Proteomics is becoming the mainstay of functional genomics because, unlike the informational-based genome, proteins are the functional molecules of cells. Proteomics gained its modern profile through the formation of two national proteomics institutes: APAF (Australian Proteome Analysis Facility) founded by Keith Williams at Macquarie University in Sydney, Australia, and the Center for Proteome Analysis located at the University of Southern Denmark, Odense, Denmark founded by Peter Mose-Larsen and Stephen Fey. The commercialization of proteomics has typically been in the biotechnology and pharmaceutical industries; however, future developments demand greater focus on bioinformatics where scientifically useful information gained from proteomics can be integrated into clinical and bioethical decision making (see PROTEOME; GENOMICS; BIOINFORMATICS). (IP)

**PROTEST:** (Medieval Latin: *prōtestum* ‘declaration’) Democratihe, industfficial objection or formal declaration. (See ACTIVISM, CIVIL DISOBEDIENCE, DISSENT, INDUSTRIAL ACTION, ANTI-GLOBALIZATION MOVEMENT, GREEN MOVEMENT, PEACE MOVEMENT) (MP)

**PROTISTS** : Single-celled eukaryotic (having their DNA enclosed in plastids) organisms including slime molds, yeasts, protozoans, and single-celled algae. Usually microscopic. Well known protests include amoeba, *Paramecium*, *Euglena*, *Plasmodium* (the pathogen causing malaria) , and *Candida* (a fungal pathogen). Protists exclude the prokaryotes (the bacteria and the archaea). (RW)

**PROTOPLAST:** A plant cell whose wall has been removed by enzymatic or mechanical means.

**PROTOPLASM:** a term indicates both the nucleus and cytoplasm. (JA)

**PROZAC:** the central role of serotonin in the modulation of depressed mood became clearer during the late 1980s when antidepressant drugs were introduced that selectively inhibited the recycling of serotonin at the synapse. The most famous member of this family (known as the selective serotonin re-uptake inhibitors), trades under the name of Prozac <sup>TM</sup> (fluoxetine is its chemical name). It has been hailed by some as an "elixir from the gods" and has become in the public mind the aspirin of emotion. By 1996 the drug had been prescribed for an estimated

fifteen million people in the United States alone. However, research shows that fluoxetine is no more effective than imipramine in alleviating depression, and is probably less effective than the tricyclic drugs in the treatment of melancholia. However, because a standard dose is required, it is simple to prescribe. Prozac's initial side-effects are less troublesome (although not in the longer term, when significant sexual dysfunction has been reported). Serotonin re-uptake inhibitors have been found effective not only in depression, but also in other discomforts, such as panic, etc. (see DEPRESSION; SEROTONIN RE-UP TAKE INHIBITORS; BRAIN NEUROTRANSMITTERS). (IP)

**PSA** : Prostate-specific antigen. Is higher level in the blood is indicative of prostate problem. See PSA Test (JA).

**PSA TEST** : Prostate-specific antigen test. A test to assess the levels of prostate-specific antigen in blood. Higher levels of the antigen is an indication of a problem in prostate. (JA).

**PSEUDO-** : Prefix or word element denoting falseness, pretence, disguise, deception, from the Greek: *pseudes* 'false'. (See MAL-, ANTI-, META-) (MP)

**PSI PHENOMENA**: See PARANORMAL PHENOMENA.

**PSILOCYBIN**: A psychedelic drug producing altered states of mood and consciousness found in various "magic" mushrooms from across the world, including *Psilocybe mexicana* (a sacred plant of the Central American First Nation peoples), or the "gold tops" and "blue meanies" of Australia (prepared in tea or eaten recreationally). It has been used in cultural ceremony and youth counterculture primarily for its hallucinogenic power, which is similar in effect to LSD and causes the alteration of moods including euphoria, perceptive and cognitive distortions such as in dreamstates, a feeling of receptiveness and acceptance, awakening of spiritual insights, highly focused but fragmented attention, disassociation, impaired motor skills, and possible nausea, illness, paranoia, hallucination or psychological disturbance. Its use may induce psychosis or schizophrenia in susceptible individuals. Psilocybin has a similar chemical structure to the neurotransmitter serotonin (see Mescaline; BRAIN NEUROTRANSMITTERS; HALLUCINATION). (IP+MP)

**PSYCHEDELIC DRUGS** : See HALLUCINOGENS

**PSYCHEDELIC LEARNING** : See RECREATIONAL DRUG INSIGHT.

**PSYCHIATRIC ETHICS** : The ethics of psychiatric medicine has a large philosophical background because of the influence of those who, like Thomas Szasz, have convinced many people that many behaviour patterns which were once regarded as pathological, even criminally so, are only different from the norm. For this reason, in many societies today it is extremely difficult to hospitalise a person for psychiatric reasons unless they clearly endanger themselves or others. And even when they endanger others, it is difficult to keep them incarcerated. The ethical principle of autonomy, usually expressed in terms of informed consent, is problematic in all others where the mental competence of the patient is borderline or unclear. This problem arises in paediatrics and geriatrics no less than in psychiatric medicine, with respect both in treatment and in research. It is often extremely difficult to tell whether the patient is really acting autonomously in giving or refusing consent. International guidelines for research on human subjects, like the oft-revised Helsinki Declaration, do not yet address this problem in much depth. (FL)

**PSYCHIATRIC WILLS** : Declarations in which persons assert in advance their desire to accept or reject psychiatric interventions that they

may be deemed to require in the future. (DM)

**PSYCHOACTIVE DRUGS** : Pharmacological agents which affect the mind or alter states of consciousness. (DM)

**PSYCHOANALYSIS** : See FREUD, SIGMUND.

**PSYCHODRAMA** : invented in 1921 by Jacob L. Moreno M.D. (1889-1974) is a diagnostic, therapeutic and educational method designed to cultivate and utilize creativity, intuition, self-education and psychological insights by accessing a wide range of intra-psychic, interpersonal and group dynamics - all possessing elements of verbal, non-verbal and imaginative realities and emotions. The essential component of the drama is creativity in order to generate activities that promote personal and interpersonal freedom and responsibility. A typical psychodrama is the family psychodrama where the therapist works with immediate or extended family members using role reversal, future projection and any other appropriate technique useful in building interpersonal, empathic concerns. (See AXIODRAMA; ROLE PLAYING; ROLE REVERSAL). (IP)

**PSYCHOKINESIS**: (Greek: *psyche* "mind" + *kinesis* "movement") 1. Sudden impulsive action or movements in a person with mania and defective inhibition. 2. In parapsychology, the terms psychokinesis or telekinesis refer to the claimed ability to move or exert influence on distant objects with the power of the mind. Strange experiments in cybernetics indicate that something similar to psychokinesis may be possible if minds and microprocessors can be combined with wireless technology; for example, using cybernetic attachments to neurons, J. Chapin and M. Nicolelis managed to link rat thought processes to the movement of food levers. Most remarkably, a transmitting device implanted into the brain of a stroke patient by researchers at Emory University in Atlanta allowed human thought processes to move a cursor on a computer screen. (See TELEPATHY, CYBERNETICS, MICROCHIP IMPLANTS) (MP)

**PSYCHOPATH**: (Greek: *psyche* "mind" + *pathos* "disease") A person with an antisocial personality disorder in which they lack empathy, guilt or moral responsibility for their actions. Also called a sociopath, the psychopath is capable of abnormally aggressive or violent behaviour and other socially irresponsible acts. (MP)

**PSYCHOSIS** : (Greek *psyche* 'mind' + *osis* 'condition'). Any mental disorder of organic or emotional origin characterized by impaired reality, diminished impulse control, gross disorder of perception and thought such as in hallucinations and delusions, but restricted to exclude the mental consequences of delirium associated with fever. Since a psychosis renders an individual *non compos mentis* by failing to distinguish between fantasy and fact, the victim is considered unfit to plead in a court of law. The International Classification of Diseases lists eight specific psychoses. Four are listed as organic psychoses (senile and alcoholic dementia, for example) which are generally the result of degenerative changes in the brain. The others are functional psychoses and include schizophrenia, manic-depressive psychosis, involutional melancholia and paranoia. (See DEMENTIA; DEPRESSION; INSANITY). (IP)

**PSYCHOSURGERY** : Treatment of psychiatric disorders by the surgical removal of cerebral tissue or by the interruption of pathways in the brain. (DM)

**PUBERTY**: (Latin: *pubertas* 'age of maturity') The developmental period of first becoming capable of sexual reproduction. It is marked by the adolescent growth spurt, maturation of the genital organs, development of secondary sexual characteristics, first ejaculation of sperm in boys and onset of menstruation (the menarche) in girls. There are also psychosocial characteristics resulting from the effects of increased



gonadal sex steroid production and the resultant maturational changes in the central nervous system (CNS). Puberty normally occurs between ages of 9-13 in girls and 12-14 in boys [Latin *pubertas* age of maturity] (see ADOLESCENCE). (IP)

**Public Consultation:** (See PUBLIC PARTICIPATION, PUBLIC OPINION, PROTEST, DEMOCRACY)

**PUBLIC HEALTH:** Protection and improvement of community health, or prevention of disease, by organized community or government effort. (DM)

**PUBLIC HOSPITALS :** Hospitals controlled by federal, state, or local governments. (DM)

**PUBLIC OPINION:** See PUBLIC PARTICIPATION, DEMOCRACY.

**PUBLIC PARTICIPATION:** See PUBLIC OPINION, DEMOCRACY.

**PUBLIC PRESSURE:** See PUBLIC OPINION, PROTEST, DEMOCRACY, NON-VIOLENT PROTEST.

**PUNCTUATED EQUILIBRIUM:** A theory about the passage of evolution, formulated by Niles Eldridge and Stephen Jay Gould in 1972 to explain gaps in the fossil record. 'Punctuated equilibrium' is evolution progress may also be seen in political revolution, the paradigm shift and the passage of life. (See FOUNDER EFFECT, EQUILIBRIUM, EVOLUTION, SPECIATION) (MP)

## Q

<a href="#">A</a>	<a href="#">B</a>	<a href="#">C</a>	<a href="#">D</a>	<a href="#">E</a>	<a href="#">F</a>	<a href="#">G</a>	<a href="#">H</a>	<a href="#">I</a>	<a href="#">J</a>	<a href="#">K</a>	<a href="#">L</a>	<a href="#">M</a>	<a href="#">N</a>	<a href="#">O</a>	<a href="#">P</a>	<a href="#">Q</a>	<a href="#">R</a>	<a href="#">S</a>	<a href="#">T</a>	<a href="#">U</a>	<a href="#">V</a>	<a href="#">W</a>	<a href="#">X</a>	<a href="#">Y</a>	<a href="#">Z</a>
<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**Q FEVER :** Caused by rickettsia *Coxiella burnetii* with fever, headache and pneumonia. Named as Q fever due to many unanswered questions. (JA)

**QABBALA:** ("Tradition" in Hebrew). See KABBALA.

**QALYs :**See QUALITY ADJUSTED LIFE YEARS.

**QUAILKEN :** A chimera of cell fusion of primitive streak in embryonic development of a chicken and a quail. (JA)

**QUALITATIVE JUDGEMENTS :** See SUBJECTIVITY.

**QUALITY ADJUSTED LIFE YEARS :** A measurement index derived from a modification of standard life-table procedures and designed to take account of the quality as well as the duration of survival; this index can be used in assessing the outcome of health care procedures or services. (DM)

**QUALITY OF HEALTH CARE :** The adequacy of patient care or of health services, as measured against social or professional standards. (DM)

**QUALITY OF LIFE :** In popular language, quality of life refers to the size of one's house and car, how often one goes out to dinner, and where one goes on holiday. In medicine, it is a technical concept measured by questionnaires about pain, depression, independence from nursing care, ambulatory mobility, etc. The degree, to which Quality of Life should be a consideration in decisions about discontinuing life-preserving treatment, is a matter for debate. (See MEANING OF LIFE). (FL)

**QUANTIFICATION:** See STATISTICS, OBJECTIVITY.

**QUANTUM:** (Latin: *quantus* "how much") A quantum is the smallest indivisible unit, usually of energy. Radiation can only be absorbed in discrete whole quanta, and the energy content of a quantum is proportional to its natural vibration frequency (expressed by  $E=h\nu$  where  $E$ =quantum energy,  $h$ =Planck's constant,  $\nu$ =radiation frequency). (See QUANTUM THEORY) (MP & IP)

**QUANTUM COMPUTING:** The application of quantum physics to computer science, a field of research pioneered by David Deutsch at Oxford University. The goal is to engineer a quantum computer which would be many magnitudes more powerful than electronic microchip technologies. This would be a calculating device utilizing the quantum properties of particles such as atoms, electrons, ions or photons to encode information. Groups of particles may provide exponential increases in calculating power, potentially allowing computations to be performed for any humanly imaginable problem and simulations for modeling or virtual reality to be run with incredible levels of complexity. New extensions to the 0-1 binary code which allow simultaneous parallel calculations are possible using quantum properties such as the superposition of electron spin states into an intermediate multiple state. Information at this scale may be measured in qubits (quantum bits). Nuclear magnetic resonance has achieved several qubits and other techniques are being investigated such as using the energy and vibration of trapped ions. The major obstacle is decoherence - disruption resulting from interaction with the environment. If the problem of decoherence is successfully tackled the next generation of computers will generate unimaginable powers and incredible technologies which would be highly valuable to commerce and the military. We will require global ethical maturity to manage any unknown risks. (See QUBIT, QUANTUM THEORY, COMPUTER, DNA COMPUTER) (MP)

**QUANTUM ENTANGLEMENT:** A condition in which a pair of quantum particles are intimately associated, or "entangled" with one another such that a measurement of one of the pair instantaneously influences characteristics of the other such as spin, despite any intervening distance between the two particles. Such quantum entanglement has been experimentally demonstrated despite apparently contradicting the view of Einstein, and has implications for philosophy, teleportation research, fiber-optic communications and quantum computing. (See QUANTUM COMPUTING, TELEPORTATION) (MP)

**QUANTUM MECHANICS:** Classical Newtonian mechanics no longer functions at atomic scales, and is replaced by quantum mechanics which describes the behavior of atoms and their component parts such as quarks, gluons and electrons, and other elementary particles such as photons and leptons. (See QUANTUM THEORY, CLASSICAL MECHANICS, QUARK, LEPTON, PHOTON) (MP)

**QUANTUM THEORY:** (Latin: *quantus* "how much" + Greek: *theoria* "speculation") Quantum theory is the branch of physics dealing with the fundamental particles of matter and their interaction with electromagnetic radiation. The theory was first pioneered by Max Planck in 1900 when his research indicated that for red-hot bodies classical laws failed to account for the expected distribution of energy between wavelengths of the electromagnetic spectrum. Planck suggested that physical systems can only have properties such as energy in discrete whole values;

small packets of energy called quanta. Subsequent studies paved the way for the development of the quantum theory of matter, which is the foundation of all modern physics as well as much of chemistry. Einstein quantized light, demonstrating that light radiation behaves like particles as well as waves. Louis de Broglie expanded these insights into the field of wave mechanics, Niels Bohr quantized the angular momentum of electrons, Erwin **Schrödinger** developed the equation describing wave functions, Paul Dirac postulated antimatter, Richard Feynman investigated quantum electrodynamics, and Werner Heisenberg developed his uncertainty principle. Despite many of its axioms seeming paradoxical and contradictory to preconceived common-sense notions of reality, there is continued scientific evidence providing support for quantum theory. Quantum theory has applications to many technologies including quantum computing, fiber-optics and nuclear research. (See QUANTUM, QUANTUM MECHANICS, QUANTUM COMPUTING, HEISENBERG's UNCERTAINTY PRINCIPLE, RELATIVITY THEORY) (MP & IP)

**QUARANTINE:** Limitation of the freedom of movement of persons who have been exposed to a communicable disease (and, loosely, of patients and infected persons), for the purpose of preventing the spread of disease. (DM)

**QUARK:** Subatomic particle. The term "quark" was coined by Murray Gell-Mann, apparently based upon the novel "Finnegan's Wake" by James Joyce. Page 363 of the novel begins "Three quarks for Muster Mark!". Quarks are considered to be a building block for protons and neutrons. Groups of three quarks form a proton or a neutron. Quarks are divided into six types, based on a quality termed "flavor". The flavors of quarks are: up, down, strange, charm, top, and bottom. The quarks constituting a proton or neutron are "held together" by gluons (see GLUON). Another quality of gluons is known as color. An "up" quark, for example, may be red, yellow, or blue. The term color in this context is not based on visual perception. (AG)

**QUBIT:** The qubit (quantum bit) is the unit of information in quantum computing. Unlike the bits and bytes of ordinary computers, a qubit can simultaneously be 0 and 1 in a superimposed state. Such multiple simultaneous calculations give quantum computing its potential extraordinary power. Two qubits can be superimposed into four states, three qubits into eight states, and several hundred qubits would be able to simultaneously make calculations equivalent to the number of atoms in the known universe. (See QUANTUM COMPUTING) (MP)

**QUEER:** an offensive slang term for homosexual which ranked number 20 in the "taboos rating" of dirty words but the term is again becoming an acceptable expression among the gay community [German *quer* athwart/across as in thwart or cross] (see QUEER THEORY). (IP)

**QUEER THEORY:** argues for a flourishing of the many sexualities; that is, "male" and "female" are not and should not be the two concepts from which all the other definitions of sex and sexuality flow. The theory maintains that the varieties of homosexuality, heterosexuality, transvestism, transsexualism and hermaphroditism are all autonomous, equally valid and normal in their own right; that is, not derived from a false notion of "maleness" or "femaleness" (see HETEROSEXUAL-HOMOSEXUAL BEHAVIOR RATING SCALE). (IP)

**QURAN** (from the Arabic root q.r.', meaning "to read") The sacred book of Islam. According to Islamic tradition, the Quran was revealed to Muhammad by God in a series of prophecies. The book is written in classical Arabic, and contains 114 chapters of varying length. In the Quran, the prophets of both the Old and New Testaments are accorded great respect, and reference is made to many Biblical characters and events. The Quran is the primary source of Islamic laws and traditions, and sections of it are recited at every Islamic prayer. (See RELIGIOUS EDUCATION). (AG)

**QUICKENING** : first movements of the fetus felt *in utero* by the mother, usually occurring between 16 and 20 weeks of pregnancy. In some

cases, movement can be felt as early as the 10<sup>th</sup> week while in other, very unusual instances, not at all. Quickening marks the period when the mother's love for her infant picks up pace. (See UNCONDITIONAL LOVE). (IP)

**QUIT SMOKING** : to desist, cease or to pay off by discharging a (drug-related) debt or obligation (dependence) as in " *we're quits* " indicating a willingness to give up. The colloquialism can also refer to quitting drugs other than nicotine. Cigarette smoking remains the most important preventable cause of disease and death thus many community-wide health education programs and smoking cessation strategies have been developed with varying degrees of success. Many make use of the mass media to target specific subgroups identified by, for example, sex, age, ethnicity and socioeconomic status. However, the majority of such smoking control efforts concentrate on increasing cessation rather than on preventing initiation. Physicians, nurses and teachers are important role models and educators for appropriate health behavior; thus cigarette smoking by individuals in these occupations undermines both of these roles. (See ADDICTION, SMOKING, QUITTING DRUGS). (IP)

**QUOTA** : A proportion of the total which is allocated or belongs to a particular individual, organization or district. (See FISHING QUOTA) (MP)

## R

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<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**RABIES** : A bullet-shaped, single-stranded RNA virus of the order *Mononegavirales* , family *Rhabdoviridae* , genus *Lyssavirus* , that causes an acute, fatal brain disease in mammals. Transmission by bite. The natural reservoir of rabies infection is in wild mammals, but it can infect domestic animals and, incidentally, humans. (RW)

**RAC**: Recombinant DNA advisory Committee of US NIH.

**RACE**: Level in the classification of organisms. A species is divided into two or more races if there are consistent observed differences between the races. So, for example, the herring gull (a bird) is divided into several races. The Western European race has a pale silver grey back and pink legs, while the Eastern Scandinavian race has a dark slate grey back and yellow legs. Both races belong to the same species and produce viable offspring when interbred.

Until the 1960s most biologists were happy to classify humans into a number of distinct races. Since then, though, the term has increasingly fallen into disfavour. This is partly because of the realisation that the genetic diversity within each so-called human race is considerably greater than the genetic distance between them, and partly because of the abuse of the term for political ends, as, for example, in apartheid. (MR)

**RACISM:** the anti-social and erroneous belief that discriminatory treatment of a particular group of human beings is (a) acceptable and (b) that such discrimination can be justified on biological grounds. Modern DNA sequencing data has established that within the human gene pool there can be more variability within one population than between different populations or "races", demonstrating significantly that the human species belongs to one biological race divided into many adaptively evolved local forms or varieties (see MISOXENIA; CHRONOCENTRISM). (IP+AG)

**RADIATION:** (Latin: *radiare* "emit rays") 1. Physics: Particles such as alpha, beta or gamma rays emitted from radioactive nuclear decay, or any transmission of radiant energy such as solar power or electromagnetic waves (See RADIATION SICKNESS).

2. Biology: The divergence of an evolutionary lineage of organisms into different niches by ecological radiation, or into different phenotypes by adaptive radiation. (See ADAPTATION, NATURAL SELECTION) (MP)

**RADIATION SICKNESS:** (See RADIATION, RADIOACTIVITY)

**RADIOLOGY :** The branch of medicine concerned with the use of x-rays, radioactive substances, and other types of ionizing radiation in the diagnosis and treatment of disease. (DM)

**RADAR:** (Abbreviation for 'RADio Detection And Ranging') Radar is the utilization of echo-location using atmospheric radio waves, such as airplane detection and car speed radars. (See SONAR) (MP)

**RADIOACTIVITY:** The chemical property of emission of radiation, and its measurement. Radiation such as alpha rays (helium nucleus), beta rays (electrons) and gamma rays (a form of electromagnetic radiation) are emitted by unstable radioactive isotopes (radioisotopes) of uranium, thorium, radium and most of the higher elements of the periodic table such as the actinides. Radioactivity was discovered and developed by scientists such as Roentgen, Rutherford, Becquerel and the Curies, and is measured by a Geiger counter. (See RADIATION, ELECTROMAGNETIC RADIATION, CURIE) (MP)

**Radiocarbon Dating:** the determination of the age of carbon samples embedded in objects of plant or animal origin by means of their content of radioactive C<sup>14</sup> carbon (see optical and thermoluminescence dating). (IP)

**RAINBOW SERPENT** the giant snake is one of the more common forms utilized by the Australian Aboriginal Dreamtime Spirit Ancestors (see Dreamtime and Dreaming). In the North and Center of Australia, it was at the time of creation that the serpent began to move through the landscape marking its unique features; for example, the black rock snake called Kurrichalpongo from the Roper River country in the Northern Territory first carved out the rivers, rock formations, mountains and bush, then ascended into the sky turning into the rainbow serpent to guide down thunder and lightning to flood the land. The Rainbow Serpent's jo creator called "Biamee" (see SACRED SITES). (IP)

**RAINBOWS** are produced by refraction and reflection of the sun's rays by millions of falling raindrops. Rainbows arRONAS AND GREEN FLASH). (IP) There is an international group called the Rainbows, who believe in peace, equality, nudism (q.v) and free love. They hold gatherings regularly in different countries, perhaps as often as once a month.(FL)

**RAPE :** Forcing another person to have sex. While legal and other methods should be used to protect women from rape, it is worth trying to see whether the incidence of rape can be reduced if more women were to learn martial arts on a serious level. (FL)

**RAINFORESTS:** See RAINFOREST DESTRUCTION, TROPICAL RAINFOREST AND TEMPERATE RAINFOREST

**RAINFOREST DESTRUCTION:** (See TROPICAL RAINFOREST)

**RANDOM:** Random means an uncertain or equally probable choice or outcome, without pattern and dictated by chaos or chance. Randomization is experimental selection or sampling using chance. Random factor implies an independent variable with random treatment level. Random error is noise. (See RANDOM SAMPLING) (MP)

**RANDOM SAMPLING:** The use of samples with equal probability of selection from the statistical population. This is the most common method for approximating a representative sample to allow accurate inferences. (See REPRESENTATIVE SAMPLE, STATISTIC) (MP)

**RANDOM SELECTION :** The use of chance in allocating research subjects to treatment groups. (DM)

**RANDOMNESS:** (See CHAOS THEORY, RANDOM SAMPLING)

**RANGE:** 1. Ecology: Species distribution, often excluding vagrant individuals and some proportion of territory within the outer range. 2. Statistics: The range of a data set is the difference between the highest and the lowest values in the set. It depends on the extremity of the end values. The interquartile range is another measure of dispersion; the difference between the third and first quartiles. (See POPULATION DISTRIBUTION, OUTLIER, PERCENTILE, MEASURES OF DISPERSION) (JA & MP)

**RAPE:** Forcing another person to have sex. While legal and other methods should be used to protect women from rape, it is worth trying to see whether the incidence of rape can be reduced if more women were to learn martial arts on a serious level. (FL)

**RATE-LIMITING FACTOR:** See LIMITING FACTOR.

**RATING SCALE:** See LIKERT SCALE

**RAW DATA:** Measurement values taken directly from the measuring instrument. (See DATA, MEASUREMENT) (MP)

**REAFFORESTATION :** Establishment of forest on deforested land. Chiefly British and Australian word; the American form is Reforestation. (See TREE PLANTING, RESTORATION ECOLOGY). (RW)

**READING:** There is more to reading than meets the eye, just as there is more information than can be absorbed in one lifetime. The essential concept in 'speed reading' is not to 'read aloud' words in your mind, a natural limit to your reading rate. Instead take in chunks of text at once – a concept at a time – absorbing the information without 'hearing' it in words. Useful related attributes are 'scanning' (reading 'past' the text to identify certain keywords), 'skimming' (quickly reading headlines and first paragraphs to 'get the gist'), and 'referencing' (using the imagination, allowing pause for reflection, developing thought and emotion, and of course providing pleasure. (See TELEVISION, INTERNET) (MP)

**REC** : Research Ethics Committee, United Kingdom, which includes both the Local and Multi-centre Research Ethics Committees. (JA)

**RECALL** : Remembrance by a patient or research subject of information given orally or in writing . (DM)

**RECESSIVE**: A trait or condition which is only expressed in individuals who have two identical versions of a particular gene, one inherited from their mother, and one from their father. (Contrast to DOMINANT) (DM)

**RECIPROCITY**: A reciprocal, or mutually beneficial two-way relationship between individuals or nations. Reciprocity is close to a universal ethical principle, with versions of the ‘Golden Rule’ common to most religions. The golden rule takes reciprocity a step further, treating others well irrespective of any past relationship. (See GOLDEN RULE) (MP)

**RECLAIM THE STREETS**: A large self-organizing community campaign which promotes road access for pedestrians, night-time safety and reduced automobile dependence. ‘Reclaim the Streets’ is a large rally a) (MP)

**RECOMBINANT DNA**: Hybrid DNA sequences assembled *in vitro* from different sources; or hybrid DNA sequences from the same source assembled *in vitro* in a novel configuration. Research using biologically active DNA which has been formed in the laboratory by the joining of segments of DNA from different sources. (DM)

**RECOMBINANT DNA ADVISORY COMMITTEE (RDAC)** : A Competent authority/committee of the Department of Biotechnology to review developments in biotechnology at national and international levels and to recommend suitable and appropriate safety regulations for a country (India) in recombinant research, use and applications from time to time. (JA)

**RECOMBINANT DNA TECHNOLOGIES**: Procedures used to join together DNA segments in a cell-free system (an environment outside of a cell or organism). A recombinant DNA molecule can enter a cell and replicate there, either autonomously or after it has become integrated into a cellular chromosome. (See DNA HYBRIDIZATION TECHNOLOGY). (DM)

**RECOMBINANT ORGANISM**: See GMOs.

**RECOMBINATION**: The formation of a new association of genetic material. It is usually applied to the process of meiosis, during a stage of which the genetic material packaged into gametes is mixed and reconstituted in any of an enormous number of possible combinations. It is also applied to genetic engineering. (DM)

**RECONCILIATION**: To re-establish friendship between differing parties; to resolve, settle or bring to agreement 2. in Australia a community response stemming from past practices of segregating and marginalizing its Aboriginal and Torres Strait Islander communities by systematically dispossessing them of their land, separating them from their children and disconnecting them from their culture and language. In this instance, reconciliation requires a sense of history with the most common theme being for white Australia to learn and understand the truth, and to apologize for the shameful legacy of Australia's history prior to the abolition of Terra Nullius. (IP)

**RECREATION OPPORTUNITY SPECTRUM (ROS)**: A regional classification tool which compares recreational opportunity at different sites according to environmental modification, human induced controls, human usage and motorization. The objectives of the ROS are to associate activity preferences and user profiles to appropriate recreational settings. Classes used range from primitive/remote, semi-primitive, roaded-natural, rural, through to urban/developed. (See TOURISM, SUSTAINABLE TOURISM) (MP)

**RECREATIONAL DRUGS**: (See DRUG DEPENDENCY)



**RECYCLING:** Remanufacturing of waste by-products to once again produce useful materials. It is now possible for industry to close the loop of waste by recycling resources numerous times. Efficient recycling practices minimise the destructive removal of new raw materials from the environment and reduce the need to dispose of contaminated wastes. (See REDUCE, RE-USE) (MP)

**REDEMPTIVE INTERVENTION** reverses an immediate consequence of unwise human action

**REDUCE:** The first and perhaps most important term in the mantra "Reduce, Re-Use, Recycle", referring to the necessity of lowering the levels and rates of human consumption. Valuable resources are wasted by unnecessary products and packaging, conspicuous consumption, and desires artificially induced by advertising. Such things must be reduced at both the personal and production levels. (See RE-USE, RECYCLING, CONSPICUOUS CONSUMPTION, DEMATERIALIZATION). (MP)

**REDUCTIO AD ABSURDUM:** Latin for “reduction to absurdity”, *reductio ad absurdum*, related to *quasi-reductio*, refers to refutation of an argument by reducing it to simpler elements thus exposing hidden absurdity. (See FALLACIES, PROOF) (MP)

**REDUCTIONIST** : based on the assumption that the whole can be explained in terms of its parts; for example, science is reductionist.

**REFERENDUM:** A people’s vote which determines an issue of policy directly, as distinct from an election of political representatives to make the decision. The ‘Citizen’s Initiated Referendum’ is a form of direct doliticians almost entirely. (See DIRECT DEMOCRACY) (MP)

**REFORESTATION** : See REAFFORESTATION.

**REFUGEES:** (See POLITICAL REFUGEES)

**REFUSAL TO TREAT** : Refusal by a health professional or a health facility to treat a patient because of bias or fear of infection (differentiate from SELECTION FOR TREATMENT, in which questions of resource allocation or of the efficacy of treatment are involved, and from TREATMENT REFUSAL, which originates with the patient rather than with the health professional). (DM)

**REGIONAL ETHICS COMMITTEES** : Committees established to protect the welfare of patients or research subjects at two or more facilities in the same geographic area. (DM)

**REGIONAL MANAGEMENT:** Policy direction, integrated management and monitoring of indicators at the appropriate macro-scales of bioregions (bioregionalism), habitats (conservation), ecosystems (ecology) or catchments (total catchment management), across terrestrial and marine environments (coastal zone management), and across large political boundaries (regional security). (See BIOREGION, BIOREGIONALISM, INTEGRATED MANAGEMENT, TOTAL CATCHMENT MANAGEMENT, MACRO-) (MP)

**REGRESSION ANALYSIS:** Regression analysis determines the relationship between two variables (the regression equation), and uses the least-squares method to find the line of best fit. Linear regression determines the straight line of best fit, and curvilinear regression determines the curve of best fit. Analysis of covariance combines analysis of variance with regression analysis. (See STATISTICS, CORRELATION, FREQUENCY DISTRIBUTION, CHI-SQUARE TEST, ANALYSIS OF VARIANCE) (MP)



**REHABILITATION** : Restoration of function, to the maximum degree possible, of persons suffering from disease or injury . (DM)

**REINCARNATION** : According to the Doctrine of Reincarnation, or Transmigration of Souls, the soul lived in another body before birth, and will be reborn in yet another one after death. According to surprisingly similar theories in Israeli Kabala (Jewish Mysticism) and in Hinduism, souls are reborn any number of times in order to learn lessons or to undergo repair ( *tikkun* , in Hebrew). This process will continue until the soul reaches perfection. One might be reborn as another human being, or as an animal, plant, rock or whatever. According to some versions, the people with whom one is in contact today are people with whom we were in contact in previous lives and places. We have met again in order to work out various tasks, lessons or repairs. Believers in reincarnation sometimes say that when we meet a stranger, and immediately find ourselves understanding one another and discussing deeply, we are not starting a new conversation but continuing one from a previous life.

In clinical ethics, a believer in reincarnation might hesitate to stop life saving treatment of, for example, a neonate with extremely severe anomalies: for perhaps living in such a way for even a short period of time will provide exactly the lesson which that soul needs. And if it doesn't do it in this lifetime, it will have to do so in another. So nothing will have been gained by stopping treatment.

Reincarnation is a doctrine, which can neither be proved nor disproved. We must wait to see what happens after death. And perhaps we won't see anything at all. Or perhaps we shall be surprised in amazing way. About that which we cannot know, a scientific attitude demands that we admit our ignorance, and approach life's decisions with the humble awareness that possibilities of which we can know nothing might be true. Although belief in reincarnation is widespread among religious Jews, not all accept it. One distinguished opponent was Rabbi Saadia Gaon. (FL)

**REINFORCING FEEDBACK**: See FEEDBACK.

**RELATIVITY THEORY** : See EINSTEIN, ALBERT.

**RELIGION**: Religion is about human meaning - an attempt to explain the peculiarity of our existence on this intermediate plane between gods and animals, between the infinite and oblivion. Religion is based on belief not scientific fact. (See RELIGIONS, LIVING RELIGION, RELIGIOUS EDUCATIONS, SCIENCE AND RELIGION) (IP)

**RELIGIONS**: The world contains a diversity of religions and belief systems which can be classified in a number of ways. Early religious belief systems included various forms of shamanism, animism, Gnosticism, paganism and polytheism. Of the major monotheistic religions, Judaism gave rise to Christianity based on the teachings of Jesus Christ, and Islam based on those of Muhammad. Muslims may be Sunni or Shiah (Shiite), Christians may be Catholic, Protestant or Orthodox. Asian religions include Hinduism, Buddhism, Confucianism, Taoism and Shinto. Followers of the philosophy of Buddha may be Mahayana, Hinayana (Theravada) or Zen Buddhists. More recently there has been a resurgence of monism ("all is one" philosophy), pantheism (the universe is a manifestation of God), indigenous beliefs (respect for the Earth) and New Age spirituality (self-styled belief systems). Other religions include Zoroastrianism, Kabbala (mystical Judaism), Sufism (mystical Islam), Brahmanism, Jains, Sikhs, Hare Krishna, Baha'i, Mormon, Anglican, Jehova's Witness, Rastafarians, Scientology, Falun Gong and various 'cult' followings. Also, atheism is non-belief in God, and agnosticism is an open mind in recognition that such things are beyond one's capacity to know. The religions of the world are a diversity of philosophies with a common theme, and should not be used as an excuse for

prejudice or conflict. Movements such as theology, comparative religion and international religious forums, institutions and Unions of Churches are progressing global culture towards a time of religious tolerance and respect where philosophical ideas are shared rather than enforced or used to promote division. (MP)

**RELIGIOUS EDUCATION:** In many parts of the world the topic of religious education remains a most controversial issue. Historically the early education of children was provided in India by the Brahmins (Hindu religious leaders), in Buddhist countries by the monks, in Islamic countries by the Mullahs and in Christian countries by the priests. However, the rise of secularism has created controversy as to the control of education. In countries such as the Netherlands and Australia groups of parents wishing to set up denominational schools receive by the government tax-funded running costs. Typically, as in the UK and Australia, the only prescribed subject in the curriculum of public (local education authority) schools is a general religious instruction where an agreed syllabus is worked out in consultation with various denominations. Parents, if they want, have the right to withdraw their children from this religious education. In the USA interpretations of the constitution have separated Church and State and parochial schools receive no public funding (See EDUCATION, MEDICAL EDUCATION, QURAN, BIBLE). (IP)

**REMOTE SENSING:** The collection of information about the Earth surface from a distance, for example with aeroplane photos or satellite data. Spatially referenced data is displayed and analysed by image processing software, interactive mapping systems and Geographic Information Systems. Remote sensing allows monitoring of military activities, land uses, vegetation types, geology, habitat integrity, ecological impacts and other changes related to environment and development. (See GEOGRAPHIC INFORMATION SYSTEMS) (MP)

**REMUNERATION:** Payment for a service or for a commodity such as a body part. (DM)

**RENEWABLE ENERGY:** Energy supplies derived from natural sources able to regenerate themselves, thereby enabling sustainable long-term consumption of energy by humans. (See SOLAR, WIND, GEOTHERMAL & BIOMASS ENERGY, HYDROELECTRIC POWER, RENEWABLE ENERGY TECHNOLOGIES) (MP)

**RENEWABLE ENERGY TECHNOLOGIES:** New technologies which generate power from sustainably managed renewable sources. The development of renewable energy technologies should be encouraged and subsidised. Long-term supply of private and industrial energy will require the replacement of old, polluting technologies such as coal-fired power stations, with new renewable energy technologies such as solar panels, wind turbines, alternatively-powered vehicles and energy generated from the sea. (See RENEWABLE ENERGY) (MP)

**RENEWABLE RESOURCES:** Natural resources which are able to replenish or regenerate themselves within a similar time frame to their utilization by humans, thereby enabling sustainable long-term consumption. Examples include sustainably managed fisheries and the cultivation of plantation timbers. (See RESOURCE, RENEWABLE ENERGY, NON-RENEWABLE RESOURCES) (MP)

**REPETITIVE STRAIN INJURY:** RSI is long-lasting injury to the muscles, joints, tendons or bone structure caused by extended or excessive repeated motions, for example in those who operate machines or computer keyboards. Ergonomic furniture, stretching, task rotation and frequent breaks help prevent RSI. The responsible worker and ethical workplace will ensure that working environment and schedules will not cause RSI in subsequent life. (See ERGONOMICS) (MP)

**REPLICATING ASSEMBLER:** See ASSEMBLER.

**REPLICATION:** 1. In statistics and experimental design, replication is the use of a significantly large number of experimental subjects,

repeats of the treatments or observations, and duplication of the research methods. (See REPRESENTATIVE SAMPLE, EXPERIMENTAL GROUPS, CONTROL GROUPS) 2. One of the defining qualities of life, replication is the ability to make copies of oneself. (See REPLICATOR, LIFE) 3. The synthesis of new DNA strands from existing DNA. In human beings and other eucaryotes, replication occurs in the nucleus of a cell. (See DNA) (DM & MP)

**REPLICATOR:** A complex structure able to copy and reproduce itself using materials from its surrounding environment. This often implies identical replication, although many replicators copy with variation. Examples of replicators include some chemicals (e.g. crystal structures), genetic code (e.g. RNA, DNA), organisms (e.g. plants, humans), information (e.g. memes, ideas) and software programming (e.g. computer viruses, artificial life). Replication is one of the essential definitional components of life. (See REPLICATION, ORIGIN OF LIFE) (MP)

**REPRESENTATIVE SAMPLE:** A sample from a statistical population must be characteristic of that population for accurate inferences to be made. For the sample to be representative it must include sufficient instances of all the different categories or classes typical of the population as a whole. This is usually achieved through random sampling, and may either be improved or biased by stratifying the random sampling across specified groups, areas or times which have been deemed representative. (See SAMPLE, STATISTIC) (MP)

**REPRODUCTION:** See PROCREATION.

**REPRODUCTIVE CLONING:** Use of CLONING (q.v.) technology to produce one or more individuals genetically identical (apart from the genes in MITOCHONDRIA (q.v.) and CHLOROPLASTS (q.v.)) to another individual. In the late 1990s reproductive cloning was used to produce clones of the adults of a number of mammalian species, including sheep, mice and pigs. The most famous of these was DOLLY (q.v.). Many countries rushed to outlaw the possibility of reproductive cloning in humans. Most bioethicists supported such bans though a minority were more ambivalent. (MR)

**REPRODUCTIVE FREEDOM:** All couples and individuals have the basic right to decide freely and responsibly the number and spacing of their children and to have the information, education, and means to do so. As stated in the *1984 UN recommendation on basic human rights*. (DM)

**REPTILIA:** The class of vertebrates breathing air with lungs, and having external scales or horny plates. Extant taxa include the turtles, crocodiles, lizards, and snakes, though reptilian phylogeny is a matter of some controversy. (RW)

**REQUIRED REQUEST:** An organ procurement policy based on the requirement that health personnel routinely make inquiry of family members about the possibility of removing organs from a patient who has been declared legally dead. (DM)

**RES NULLIUS:** in Latin "belonging to no one" (see AUSTRALIAN ABORIGINAL & NATIVE TITLE LEGISLATION - AUSTRALIA). (IP)

**RESEARCH AND DEVELOPMENT:** Research and Development (often abbreviated to R&D) is the exploratory process of research and scientific discovery. Allocations of research funding (or more correctly, the lack thereof) are one of the most popular subjects for jokes and complaints in the scientific and academic communities. The 'Frascati Manuals' are periodic OEethical consider PRINCIPLE, TECHNOLOGY) (MP)

**RESEARCH ETHICS COMMITTEES:** Institutional committees established to protect the welfare of research subjects. (See ETHICS COMMITTEE). (DM)

**RESIDENTIAL FACILITIES:** Facilities that provide supervision and assistance in activities of daily living. (DM)

**RESILIENCE:** *ecology* : The tendency of an ecosystem to maintain a stable state despite disturbance. (RW)

**RESISTANCE TO CHANGE:** See TECHNOLOGY.

**RESOLUTION:** Degree of molecular detail on a physical map of DNA, ranking from low to high. (DM)

**RESOURCE:** A source of supply for some human necessity, deficiency or desire. Resources may be stocks or reserves, information, aid or support, material, energy or features of the natural environment. Excessive demands on natural resources are currently placing global ecosystems under threat, particularly as a result of habitat destruction and degradation with its associated loss of biodiversity. Resource consumption can only endure over the long term if current non-renewable resources are able to be replaced with the sustainable management of alternative renewable resources. (See NATURAL CAPITAL, RENEWABLE RESOURCES.) (MP)

**RESOURCE ALLOCATION:** Societal or institutional decisions about the distribution of available resources, for example water allocation between the needs of irrigation farmers and riverine ecosystems, or resource allocation to and within government policies, research programs, education institutions, health care and medical resources. (See RESOURCE) (DM & MP)

**RESOURCE-BASED PRICING:** Pricing of goods and services which reflects the environmental and social costs of the associated extraction of natural resources and production of the product. This provides a monetary disincentive to production processes which are environmentally damaging. (See RESOURCE) (MP)

**RESOURCE PARTITIONING:** See HABITAT PARTITIONING

**RESPECT:** Show regard, consideration or esteem for; that is, refrain from interfering with (see RESPECT FOR LIFE). (IP)

**RESPIRATION:** (Latin *respirare* 'to breathe'). The term can be applied to the events which occur at the level of the whole organism (i) or its constituent cells (ii). (i) The breathing pattern or rhythmic inflation and deflation of the lungs which maintains a steady concentration of oxygen and carbon dioxide for cellular metabolism. The control of respiration is partly chemical and partly nervous. (ii) Cellular respiration - the oxidation of the end products of glycolysis (the enzymic breakdown of glucose to pyruvic acid) to carbon dioxide and water (the tricarboxylic acid cycle) with the generation of 36 molecules of ATP per glucose molecule. Aerobic respiration involves the molecular exchange of oxygen and carbon dioxide within the body's tissues. (See PHOTOSYNTHESIS). (IP)

**RESPONSIBLE:** 1. legally or ethically accountable for the care or welfare of another 2. involving personal accountability or ability to act without guidance or superior authority; that is, answerable for one's own behavior by being capable of making rational or ethical decisions 3. being the source or cause of something 4. able to be trusted or depended upon, being reliable 5. based upon good judgment sound thinking. (IP)

**RESPONSIBILITY:** The act of being responsible (e.g. reliable); accountability (e.g. in law); ownership of the success or otherwise of an undertaking (e.g. business practices); responsibilities are the equal partner of rights - those with human rights are the ones who have the power and therefore the responsibility for those without rights. (See RESPONSIBLE) (MP)

**RESTORATION ECOLOGY:** Rehabilitation of ecological components of land previously degraded by humans. Reconstruction of a damaged site involves environmental reclamation including the removal of infrastructure, clearing of potential pollutants, and contouring of the land surface and topsoil. Ecological rehabilitation then includes local ecosystem research, bioremediation, nursery, planting and maintenance of appropriate trees, reforestation, habitat restoration, fauna management and ecosystem monitoring. Restoration ecology is an important final component of any extractive development process such as mining or forestry. Restored ecological systems are usually less natural and diverse than originals, and should be considered an adjunct to habitat preservation. Many ecologists are philosophically predisposed to conservation rather than restoration. (See BIOREMEDIATION, TREE-PLANTING) (MP)

**RESTRICTION ENZYME, ENDONUCLEASE:** A protein that recognizes specific, short nucleotide sequences and cuts DNA at those sites. There are over 400 such enzymes in bacteria that recognize over 100 different DNA sequences. See *restriction enzyme cutting site*. (DM)

**RESTRICTION ENZYME CUTTING SITE:** A specific nucleotide sequence of DNA at which a restriction enzyme cuts the DNA. Some sites occur frequently in DNA, every several hundred base pairs, but others occur much less frequently, may be every 10,000 base pairs. (DM)

**RESUSCITATION:** The reviving of patients from unconsciousness or apparent death, e.g., by restoration of breathing after respiratory arrest or of heartbeat after cardiac arrest. (See DNR, EMERGENCY CARE, RESUSCITATION ORDERS). (DM)

**RESUSCITATION ORDERS:** Instructions, policies, and decision making regarding the reviving of patients whose respiration and/or heartbeat have stopped. (See DNR ORDERS). (DM)

**RETROVIRUS:** A family of Viruses whose genetic material is RNA and is further characterized by the presence of reverse transcriptase in the virion. They can convert RNA to DNA and back to RNA. HIV is a retrovirus. (DM) .

**RE-USE:** This term in the phrase "Reduce, Re-Use, Recycle" refers to using goods and materials again rather than discarding or replacing them. Appreciate items for their usefulness and function rather than their newness and fashion. This form of direct recycling requires no expenditure of energy in the processes of remanufacture. (See REDUCE, RECYCLING) (MP)

**REVIEW COMMITTEES:** See ETHICS COMMITTEES.

**REVIEW COMMITTEE ON GENETIC MANIPULATION (RCGM):** A Competent authority/committee of the Department of Biotechnology to monitor the safety related aspects in respect or on-going research projects and activities involving genetically engineered organism/hazardous microorganism. Its members may be drawn from other Government departments such as Indian Council of Medical Research. The function of review committee may include prescribing the procedures, restricting or prohibiting production, sale importation and use of such genetically engineered organisms and their cellular components. (JA)

**REVERSE GENETICS:** Process that involves production of DNA from RNA in the reverse direction to the central dogma of molecular biology. Applied to consider the genetic technology of producing living organisms from dead (frozen /preserved in alcohol) organism's DNA materials. E.g. Frozen mammoth. (DM, JA)

**REVERSE TRANSCRIPTASE:** An enzyme capable of directing the production of a single-strand DNA copy from an RNA template. (DM)

**REVOLUTIONARY:** An adjective describing revolution, or a noun describing an individual involved in ideological activism and revolution. From the authoritarian communalistic perspective, the revolutionary is a violent or reactionary menace. For the individualist however, the

word often puts a positive connotation on the act of civil disobedience or resistance against oppression. (See FREEDOM FIGHTER, ACTIVISM, TERRORISM) (MP)

**RFLP, RESTRICTION FRAGMENT LENGTH POLYMORPHISM:** Variation in DNA fragment sizes cut by restriction enzymes; polymorphic sequences that are responsible for RFLPs are used as markers on genetic linkage maps. (DM)

**RHYTHM METHOD OF CONTRACEPTION:** The avoidance of sexual intercourse near the middle of a 28-day cycle when an egg is most likely to be present in the oviduct but this method is not safe and is best combined with some other method of contraception. (See NATURAL FAMILY PLANNING METHODS). (IP)

**RIBONUCLEIC ACID:** See RNA.

**RIBOSOMAL RNA, rRNA:** A class of RNA found in the ribosomes of cells. *give function.*

**RIBOSOME:** The small cellular organelle where polypeptides are assembled from amino acids based on messenger RNA templates. (RW)

**RICIN:** A deadly toxin obtained from castor bean *Ricinus communis* that produces agglutination of red blood cells and hemorrhage of the respiratory and gastrointestinal mucosa. The toxin has been used as a biological weapon in the hands of terrorists (see BIOLOGICAL WARFARE). (IP)

**RIGHTS:** A right might be defined as the freedom to do what one has a duty to do. This might be the freedom which one actually has, or the freedom, which one ethically ought to have. The former may be called *positive rights*, and the latter *ethical rights*. If one believes in the Bible, or a similar doctrine according to which God commanded things to exist, and commanded plants, animals and humans also to be fruitful and multiply, then everything -- including rocks, water and fire -- will have a right to exist, and plants, animals and humans will also have a right to be fruitful and multiply. Sometimes duties, and therefore also rights, come into conflict. I cannot exist unless I eat other creatures and deprive them of their duties and rights to exist. I have, however, no more rights than my duties require. So I have no right to eat more than what I must eat in order to be healthy and survive. Certainly if we have a right at all to kill animals for meat, we have no right to a milligram more meat than we need for health. If some people need less meat than others, they have less of a right to it.

If we do not believe in the Bible or any other metaphysical source of duties, it is much harder to prove the existence of ethical rights. Indeed the great theorists of natural and inalienable rights, like John Locke and the framers of the United States Declaration of Independence, believed in God. Without such belief, someone else may contradict anyone's claim to a right or a duty, with no clear method to decide the argument other than by a contest of power. In such a case, only positive rights will exist. And only those who manage to fight for rights and win will have them. (FL)

**RIGHT TO DIE:** A right claimed by patients or their representatives to make decisions with regard to the patient's dying, such as by refusing life-sustaining medical care or by requesting assistance in dying. (See ADVANCE DIRECTIVES). (DM)

**RISK :** The probability of adverse effects, their nature, and their severity over a range of exposures. For example, a function of the probability of an adverse health effect and the severity of that effect, consequential to a hazard(s) in food. A risk is an expected danger or a problem situation around the corner, due to the introduction of a new technological situation. e.g.. introduction of GM crops/antibiotic resistance due to

the proliferation of drugs, interspecies transfer of genes, creation of new bioweapons -pathogenic organisms, crop failure, reduction in biodiversity, privatization of natural resources and patenting. (DM, JA)

**RISK ANALYSES:** See RISK ASSESSMENT , RISK MANAGEMENT AND RISK COMMUNICATION.

**RISK ASSESSMENT:** Science of understanding hazards - identification, possibility of their occurrence and the consequence of such occurrence. i.e. characterizing the risk. (JA)

**RISK COMMUNICATION:** The interactive exchange of information and opinions concerning risk among risk assessors, risk managers, consumers and other interested parties. (JA)

**RISK MANAGEMENT:** If the assessed risk is dangerous then it includes weighing policy, selecting, implementing control options, regulatory measures. (JA)

**RISK/BENEFIT:** A decision-assisting process that attempts to identify, estimate and weigh all the risks and benefits associated with a particular action and to determine whether overall the benefit would be worth the associated risk. (DM)

**RITALIN:** See RITALIN HYDROCHLORIDE.

**RITALIN HYDROCHLORIDE:** Trademark for methylphenidate hydrochloride, a central nervous system stimulant that has been used successfully in the treatment of children suffering from attention-deficit hyperactivity disorder. The drug acts by stimulating the brain to increase the amount of dopamine available to it, however, there are side effects associated with this treatment including growth retardation, insomnia, decreased appetite and nervous tics. Therefore, medicating young people is controversial; especially in the absence of more severe mood disorders it should not be forgotten that high levels of activity, precociousness and curiosity are often simply normal childhood characteristics. (See ATTENTION-DEFICIT HYPERACTIVITY DISORDER). (IP)

**RNA, RIBONUCLEIC ACID:** A chemical found in the nucleus and cytoplasm of cells; it plays an important role in protein synthesis and other chemical activities of the cell. There are several classes of RNA molecules, including messenger RNA, transfer RNA, ribosomal RNA and other small RNAs, each serving a different purpose. Contains uracil as a base pair. Similar to DNA in structure and plays an intermediary role in converting information from DNA to ribosomes where proteins are made. (DM,JA)

**RNAi:** Double stranded interference RNA, can destroy messenger RNA sequence, can slice any gene. (JA)

**ROBOT:** (Czech: *robota* "work" or "servitude") An automated electromechanical device imitative of human anatomy or actions, often with programming to perform certain human-like functions such as perception and manipulation. The term was coined by Karel Capek, robots defined in his 1920 play *Rossum's Universal Robots* as mass-produced mechanical humanoids for cheap labor. Since then robots have become a staple of fiction, popular culture, science, technology and work. About half of the world's operational robots are in Japan, with the world robot population in 2000 roughly 1 million. Most of the robot workforce are non-complex "dumb" robots engaged in repetitive tasks humans in speed, strength, stamina and precision, and are used in the commercial production of cars, electronics and chemicals. An "intelligent" robot uses its sensory apparatus and adapt as well as follow its programming. Robots can work in hazardous, extreme or remote environments such as the exploration of space (probes) and the deep sea (aquabots) contributes to prosthetics and bionics (cyborgs), and the design of robots often imitates the human form (androids). Some parents have interactive robot dogs as pets, and this is eagerly anticipated by others. Modern snake-like robots used for earthquake rescue are comprised of numerous interchangeable segmented units acting as a network.

Robot spy-pssiles are currently used in international conflict. In the future self-replicating robots constructed from atoms and molecules (nanobots) may swarm the battlefield or sweep theerol and other illnesses. (See ANDROID, AQUABOT, CYBORG, NANOBOT, ROBOT BUSH, ROBOT ETHICS, ROBOTICS) (MP)

**ROBOT BUSH:** A hypothetical thought experiment by Hans Moravec in *Mind Children: The Future of Robot and Human Intelligence*, designed to illustrate the outermost extremes of potential advancement in robot technology. "A bush robot would be a marvel of surrealism to behold." It capitalizes on the manipulative utility of limbs and fingers, being comprised of numerous such extensions into smaller and thinner branches and then cilia. These dexterous self-constructing mechanical joints would be so numerous as to give the robot "organic" flexibility. The adaptable leaf fingers are antennae able to radio-communicate and sense forces, movement, electromagnetics and light among other things. With artificial intelligence and coordinated neural networking, they could divide into a swarm of smaller units which could burrow, swim, fly like insects and collect environmental data relevant to the parent robot's knowledge and survival. Taken further, the fingers could subdivide down to the realm of nanotechnology, in which case the abilities of such a robot would truly appear like magic. CHNOLOGY) (MP)

**ROBOT ETHICS:** The flip sides to ethics in relation to robots and artificial intelligence are: 1. How should we treat them, and 2. How will they treat us? Robots and androids like 'R2D2' and 'Atom' (*Astroboy*) are already considered 'part of the family' by younger media ider ethics in their own attempts at survival? Isaac Asimov proposed his Three Laws of Robotics in 1942: "1) A robot may not injure a human being, or, through inaction, allow a human being to come to harm; 2) A ; 3) A robot must protect its own existence except where in conflict with the first or second law." The fear is that learning machines may not be that easily 'programmed' (e.g. *Terminator* or 'Hal' in *2001*). The combination of human and machine (bionics, microchip implants, creation of cyborgs) provides another dimension relevant to medical bioethics. (See ROBOT, ROBOTICS, ARTIFICIAL INTELLIGENCE, BIONICS, CYBORG, MICROCHIP IMPLANT) (MP)

**ROBOTICS:** The science and technology of robot design, engineering and operation, combining artificial intelligence with mechanical engineering. Each requirement of a robot has technology to match, for example seeing (video), hearing (audio), perception (radio-waves), understanding (face/speech recognition), walking (locomotion), manipulation (cybernetic networks), problem-solving (heuristics, expert systems), thinking (artificial intelligence), action (robot body), interaction (learning procedures) and self-evolution (artificial life). Robotics has the job of integrating such functions, including both design/engineering and programming for dealing with the environment. Experimental robotics is conducted for example at NASA and MIT and by Japanese technology companies, surveyed by the International Federation of Robotics. The field of robotics is applied to business (e.g. consumer robots), policy (e.g. expert systems), medicine (e.g. bionics, cyborgs), engineering (e.g. cybernetics), industry (e.g. assembly-line), hazardous work (e.g. radioactive materials, bomb disposal), military (e.g. autonomous vehicles, missiles) and exploration (spacecraft, submersibles). Robotics may provide economical exploration of the solar system with larger numbers of smaller robotic space probes. Robotics presents its greatest risk to humans when applied to artificial intelligence (AI), providing computers with thinking and learning ability, senses and a 'body' witf armed robotic vehicles or nanobots possible in future combat. (See ROBOT, ARTIFICIAL LIFE, ARTIFICIAL INTELLIGENCE, CYBERNETICS, BIONICS, NANOTECHNOLOGY) (MP)

**ROBOTIC WARFARE:** See VIRTUAL WARFARE.

**ROBUST:** Able to withstand utilization; for example robust machinery is tough and long-lasting, and a robust model is able to stand up to model testing such as sensitivity analysis. (See SENSITIVITY ANALYSIS) (MP)



**ROLE PLAYING:** Is a method to discover the best approach for a problem and is the most often used in business, industry and education. In general it is not aimed at discovering the deeper feelings involved in a person's behavior. (See **ROLE REVERSAL**; **PSYCHODRAMA**; **AXIODRAMA**). (IP)

**ROLE REVERSAL:** Is where the major participants in an interaction change roles aimed at transcending the habitual limitations of egocentricity and reach a space where empathy for the other person's viewpoint or feeling can be accurately assessed. (See **ROLE PLAYING**; **PSYCHODRAMA**; **AXIODRAMA**). (IP)

**ROMA:** Known by many names, the Roma are commonly known in English as Gypsies. Various Roma populations may be found in Europe, the Middle East, and North America. The Roma were traditionally travellers, and have suffered much discrimination, especially in Europe. They were targeted, along with the Jews, as primary victims in the Holocaust. The origin of the Roma is not totally clear, although their language appears to be of northern Indian origin. Their language was traditionally unwritten, and not standardized and this accelerated the development of local dialects into quite distinct forms. The result is that many forms of the language of the Roma, known as Romany, are not mutually intelligible. (AG)

**ROS:** See **RECREATION OPPORTUNITY SPECTRUM**.

**ROUNDUP:** Glyphosphate, a very widely used, systemic, non-selective herbicide. Monsanto has genetically engineered some crops, notably soybeans, with glyphosphate tolerance to facilitate weeding of fields. (RW)

**RSI:** See **REPETITIVE STRAIN INJURY**

**RU-486:** The steroidal antiprogestin mifepristone produced by xxxx as its trade name, which is capable of inducing early abortion by inhibiting the secretion of progesterone. (DM)

**RUSSELL, BERTRAND:** (1872-1970) An English mathematician, philosopher and peace activist, Lord Russell was one of the most prolific and influential philosophers of the nineteenth and twentieth centuries. *Principia Mathematica*, which he co-authored with Alfred North Whitehead, was an attempt to translate mathematics into the language of formal logic, and to formulate axioms from which all mathematics could be deduced. This enterprise was frustrated by Kurt Godel's 1931 proof that all such systems must be incomplete. But the book nonetheless laid the foundations for the logical analysis of mathematics, language and science. Even though this book was co-authored, it was essentially a development and formal working-out of the ideas of an earlier work, *Principles of Mathematics*, which Russell wrote himself. Russell's contributions to almost every branch of philosophy were immense. In an early paper, "On the notion of cause" he worked out in detail Hume's substitution of the idea of *regularity*, for that of *necessary causal connexion*. The outcome is that *cause* itself becomes an outmoded concept, with is replaced by that of laws describing regularities of correlation between one kind of event and another. This is the philosophical background behind accepted thinking in medicine and epidemiology today, in which it is rarely said that a certain kind of event *causes* certain clinical symptoms. It is said instead that these events are *correlated* or *associated* with those symptoms.

Russell's *A History of Western Philosophy* (1945), has always been unpopular among academic philosophers because of its readable and somewhat flippant style, and a few inaccuracies. But it remains a valuable reference book until this day. It has been consulted frequently for the dates of most of the philosophers referred to in this *Dictionary*.

Russell's ethics was not only philosophical. He was willing to make personal sacrifices for his principles. As an outspoken pacifist, active in the *No-Conscription Fellowship* during World War I, he was jailed for his activities. He wrote his *Introduction to Mathematical Philosophy* while serving his jail term.

Russell's intellectual courage is a model for philosophers and bioethicists. Some people hang on to their ideas, and hesitate to learn new things for fear that their long-held opinions might be challenged. Russell was the opposite. He began every enquiry with an open mind, ready to discover new truths. If what he discovered happened to contradict what he had written before, he did not resist, but accepted this as a further step towards truth. Although Russell was a pacifist during World War I, he later recognised Nazism as a threat to humanity, and supported the Allied war effort in World War II. (FL)

**RYLE.G:** (1900-1976) Gilbert Ryle was one of the most influential in the Oxford School of Ordinary Language Philosophy. These philosophers taught that the purpose of philosophy is to analyse our concepts. This is done by observing and recording how we use words in ordinary language. In his book *The Concept of Mind*, he argued that we do not learn about the mind through neurobiology, but rather by analysing how we use words, like *thought*, *pain*, and *pleasure*, which refer to our mental lives. (FL)

**S & M:** See SADOMASOCHISM.

## S

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<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**SACRED SITE:** A site that has special religious meaning to a group of persons. To the Aboriginal Australians include burial grounds, ceremony grounds, spirit places and places formed by the actions of spirits or ancestors (see Dreamtime and Dreaming & Rainbow Serpent). The sites marking the location where the Dreamtime Spirits re-entered the Earth after creation are specially sacred as the power of the Dreaming force continues for the good of all living inhabitants of that land; however, its traditional laws have to be respected in specified ways. Their location is kept secret from those who have no relation to this knowledge and who are not initiates of that particular Dreaming - the latter are forbidden to go there on pain of illness or death. (IP, DM)

**SAD:** See SEASONALLY AFFECTIVE DISORDER

**SADISM:** Sadism is a form of satisfaction, commonly sexual, derived from inflicting pain or harm on another individual. It is a mental disorder which manifests in antisocial behaviour such as verbal or physical aggression. The term is derived from the Marquis de Sade (1740-1814), a French soldier initially condemned to death for his cruelty and sexual perversions but later imprisoned in the Bastille, during and after which he wrote licentious novels. (See MASOCHISM, SADOMASOCHISM). (IP, MP)

**SADNESS:** See DEPRESSION.

**SADOMASOCHISM:** Sado-masochism (SM) is the acting out of sexual fantasies based around roles of domination and submission, often involving discipline, emotional ridicule, rope bondage and/or physical flagellation. In the underground sex community it also goes by the name S & M (short for Sadism and Masochism, or alternately Slave and Master). Harm minimizations, such as precautions with blood, feces and implements, are paramount as this may be one of the riskiest forms of sex. Ethical philosophy in SM precludes doing anything without the freely-given informed consent of a sane adult, or causing injury requiring a physician/psychotherapist or risk of death or irreparable damage, even with consent. (See SADISM, MASOCHISM) (MP)

**SAFE PERIOD:** misleading name for the days during each 28-day menstrual cycle when sexual intercourse is least likely to be followed by pregnancy. (See NATURAL FAMILY PLANNING METHODS). (IP)

**SAFETY:** The reasonable certainty that no harm will result under expected conditions of use. (DM)

**SALAAM:** *Salaam* or *salem* means ‘peace’ in the Arabic language. The salutation is often used in greeting, as in *assalum ‘alaikum* (‘peace be with you’), illustrating the fact that peace and charity are central concepts of Islam. (See SHALOM, SHANTI, PEACE) (MP)

**SALINIZATION:** See ACID SULPHATE SOILS.

**SALT :** 1. A salt is a soluble crystalline solid compound (e.g. carbonates, chlorides, nitrates), including common salt (halite or sea/rock/table-salt) sodium chloride (NaCl). Chemical salts in the environment and food chain have implications for human, ecological and agricultural health. (See SALINIZATION) 2. Acronym for Strategic Arms Limitation Talks (SALT I and SALT II) and/or Strategic Arms Limitation Treaty. (MP)

**SAM :** Surface-to-Air Missile.

**SAMPLE:** A sample is a subset of observed data drawn from the whole population set, to be used in statistical inference. A sample can estimate conclusions about the entire set if the sample size is sufficiently proportional to the size of the whole statistical population, and if it is randomly or representatively selected. (See STATISTIC, REPRESENTATIVE) (MP)

**SANCTITY OF LIFE:** The principle that life is sacred and cannot be killed. (DM)

**SANCTIONS:** Sanctions are non-military impositions placed on a country perceived to be behaving out of line with the international community. They may include unilateral or multi-national trade restrictions and interruptions to transport, media, economic and diplomatic relations. The object of sanctions is to coerce a national government to change against its will. United Nations sanctions at different times have

included arms embargoes (e.g. South Africa, Somalia, Haiti, former Yugoslav republics), restricted sanctions (e.g. Libya) and economic sanctions (e.g. Yugoslavia, Iraq). Military sanctions are a powerful tool for preventing the spread of nuclear or conventional weapons and small arms, but economic sanctions have been criticized on ethical grounds for the suffering and death they inflict on populations with limited access to food, basic medicines and general life satisfaction. (See ECONOMIC SANCTIONS) (MP)

**SANGER, MARGARET:** (1879-1966) an American human rights campaigner who coined the term "birth control" as a positive description of family limitation to replace the old economic term "neo-Malthusianism" (after Malthus's message that contraception was the logical response to poverty posed by over-population). Building on her wide experience as an obstetrical nurse working for single mothers and underprivileged families, Sanger became convinced that the high infant/maternal morbidity and mortality rates, especially found in "backyard" and self-induced abortions, could only be confronted by liberating women from unwanted pregnancies. Accordingly, and in defiance of the then prevailing climate of "righteousness", she founded in 1914 the magazine "*Birth Control Review*" in which she publicized contraceptive methods. In 1921 Sanger founded the American Birth Control League, in 1927 she organized the first World Population Conference in Geneva, in 1936 she was instrumental in modifying the Compstock Act to permit doctors to prescribe contraceptives, and in 1953 was elected the first president of the International Planned Parenthood Federation (see STOPES, MARIE). (IP)

**SANSKRIT:** Ancient language of northern India. The word Sanskrit (samskrta) means "polished speech", as distinguished from the speech of the common people, which was known as "Prakrit" (prakrta). The earliest form of Sanskrit is found in the Veda. A dialectal variant of Sanskrit known as Pali is the language of the classical Buddhist writings. (AG)

**SAPPHO OF LESBOS:** (~ 617-612 BC) was the greatest lyric poet of early Greek antiquity who created a circle round herself of female friends and students. Faced with male-dominated society where military masculinity was the supreme virtue, Sappho dared to oppose this with the lyricism of femininity expressed through verse and song. She was slandered for female homosexuality, was married, had a daughter and in the end suicided for the love of a man (see LESBIAN/ISM). (IP)

**SAS :** Special Air Service (UK/Australia)

**SATAN:** (from the Hebrew root s.t.n., meaning "to obstruct, to block the way"). The original meaning of this word in Hebrew is an adversary, or one who blocks the way. The word appears in this meaning in several places in the Old Testament. However, in the book of Job, there is reference to "the Satan" who criticizes God's statements and tries to tempt Job into sin. It is this Satan figure that is later developed in Jewish, Christian and Muslim traditions as the adversary of God, the one who represents rebellion against God's word. Later interpretations look for hints of Satan in this sense in various other places in the Old Testament. For example, the Serpent of the Garden of Eden story in Genesis is often explained as a form of Satan. In the Greek of the New Testament, the word "Satanas" various times as the being which tries to bring about temptation, especially trying to tempt Jesus, and the one whom Jesus will vanquish in a future time. The development of the character of Satan is more pronounced in Christian literature than in Jewish or Muslim literature. For example, in Jewish writings, there is a greater tendency to refer to "Yetser Hara' " (the evil inclination) as a source of temptation than the use of the word Satan. (AG)

**SATELLITE:** 1. A moon circling a planet, e.g. Jupiter's satellites include Europa, Io and Ganymede. 2. A technology designed for and deployed into Earth's orbit, for example communications, research and spy satellites. (See SPUTNIK, COBE, HUBBLE TELESCOPE,

SPACE EXPLORATION) (MP)

**SATISFACTION:** (See PUBLIC OPINION)

**SAVAGE** outdated use a derogative description of indigenous peoples, in particular black.

**SAVANNAH:** The tropical grassland habitat and community, for example between Africa's Sahara desert and Congo basin rainforest. Characterized by grasses and riate agricultural practices. Similar tropical and temperate grassland habitats are common, for example the American prairies and semi-arid Australia. (See HABITAT TYPES, SCLEROPHYLL FOREST) (MP)

**SBS (SPECIAL BROADCASTING SERVICE):** Award-winning Australian free-to-air multicultural broadcaster including multi-language radio service and commercial-limited public television channel presenting an admirably diverse range of otherwise non-commercially viable world movies, cultural oddities and intellectually-based global news. Paradoxically, the premier channel of Australian TV is also the least watched. Entities such as SBS which sustain cultural diversity must be carefully conserved in this era of dumbing-down for the mass media market. (See CULTURE JAMMING, MULTICULTURALISM) (MP)

**SCALE:** Scale is the size or dimensions of a system. 'Spatial scale' is the extent of something in three-dimensional space, measured in meters or light-years. 'Temporal scale' refers to extent in the fourth dimension, time, measured from seconds to millions of years for geological time. Standard SI Unit multipliers are as follows: atto- $10^{-18}$ ; femto- $10^{-15}$ ; pico- $10^{-12}$ ; nano- $10^{-9}$ ; micro- $10^{-6}$ ; milli- $10^{-3}$ ; centi- $10^{-2}$ ; deci- $10^{-1}$ ; deka- $10^1$ ; hecto- $10^2$ ; kilo- $10^3$ ; mega- $10^6$ ; giga- $10^9$ ; tera- $10^{12}$ ; peta- $10^{15}$ ; exa- $10^{18}$ . Systems are defined by spatial scale, from nano- (atoms), micro- (molecules, cells), through macro-scale (ecosystems, cities) to mega-scale (global environment). Natural and human ecosystems are measured at the genetic, individual, family group, local community, habitat, catchment, bioregion, city, state/province, national, international and global scales. System dynamics are measured in temporal scale from small periods (e.g. feedback) to large periods of time (e.g. astrophysics). Problems and policy must be addressed to the correct scale. Behaviors of larger scale systems may be dependent on changes in smaller scale systems. 'Spatial and temporal scaling' is the application of this knowledge across these scales. 'Scale-and-category grammar' is a language model based on substance, form and context. A wonderful illustration of the breadth of scale is Kees Boeke's *Cosmic View*, which traverses from the scale of a human individual both inwards to subatomic levels, and outwards to the scale of the universe. (See SPACE, TIME, SYSTEMS THEORY, MEASUREMENT, HIERARCHY, BIOREGION, INTEGRATED MANAGEMENT, EARTH FROM SPACE) (MP)

**SCHUMACHER, ERNST:** See SUFFICIENCY.

**SCIENCE:** Intellectual discipline characterised by its investigation of the natural world (biological, chemical and physical) by means of procedures that are, at least in principle, independent of the persons who employ them and are published in sufficient detail for others to repeat them and so check any reported findings. (See SCIENTIFIC METHOD). (MR)

**SCIENCE FICTION:** Science fiction is imaginative fantasy based on science. There is a distinction between "soft" and "hard" science

fiction, the latter adhering as closely as possible to current understanding of physical laws and the limitations of technology. Leading "hard" science fiction authors such as Arthur C. Clark and Isaac Asimov have predicted and guided significant real advances in technology such as satellites and robotics. Science fiction, from the classic tradition to cyberpunk and including the utopian and dystopian literature, is of course a vibrant source of bioethical discussion. The genre entertainingly places human and alien societies in potential future contexts of science, technology and sociopolitical organization. (See SCIENCE, UTOPIA, DYSTOPIA, CYBERPUNK, FUTUROLOGY) (MP)

**SCIENCE OF CHOICE:** The ability to choose between alternative behaviours.

**SCIENTIFIC METHOD :** The process by which scientists expand and improve scientific knowledge. Four steps characterize the scientific method: 1. observations that lead to a question or problem; 2. formation of a hypothesis (or hypotheses) that answers the question or solves the problem; 3. making predictions from the hypothesis; and 4. experimental or observational testing of the predictions. If the predictions are true, then the results support the hypothesis; however, the scientific method lacks any way of proving scientific information with absolute certainty. Hypotheses that are repeatedly supported by independent investigators and in multiple tests gain acceptance; those hypothesis that are consistently corroborated become theories or, especially in physics, natural laws. If the predictions are false, then the hypothesis is rejected and must either be discarded as false or modified to accommodate the new observations. The scientific method is also known as the hypothetico-deductive method. A key feature of the scientific method is the fact that every scientific idea must be subject to testing, in other words, falsifiability. The scientific method has been extremely successful in producing and improving a body of knowledge that is demonstrably reliable. (See SCIENCE, DEDUCTION, INDUCTION, HYPOTHESIS). (IP+RW)

**SCIENTIFIC MISCONDUCT :** Violation of laws, regulations, or professional standards in any scientific research. (DM)

**SCIENTIFIC PARADIGM:** See PARADIGM.

**SCIENTIFIC THINKING:** Thought and rationalism based upon principles of questioning, systematic reduction, value-neutral objectivity, parsimony, logical consistency, and usually but not always agreement with existing knowledge. Value is placed on predictive power and explanatory power. Distinction is made between data, assumptions, hypothesis and theory. Knowledge is gained through testability and falsification using experiments, controlled observations, replicability and quantification. Science is better at reductionism than synthesis. Scientific thinking is often based on critical analysis, something best kept contained in social or family situations. Scientific thinking is often mistrustful of that which is not testable, but the limitations of science become apparent when dealing with many subjects either of great philosophical abstraction or of great complexity. (See SCIENTIFIC METHOD, FALSIFICATION, REDUCTIONIST, ANALYSIS, DEDUCTION, INDUCTION, PARSIMONY, EXPERIMENT, BEST AVAILABLE INFORMATION, KNOWLEDGE, EXPERT) (MP)

**SCHIZOPHRENIA:** A psychotic disorder characterized by personality disintegration and distortion in the perception of reality. Overall terms given to several related mental disorders characterized by a disconnection between feelings, thoughts and actions. Word made its first appearance in the English language in 1912 (Greek *skhistos* split and *phren* mind) (see HALLUCINATION). (DM,IP)

**SCIMAC:** An organization "supply chain initiative on modified agricultural crops", composed of a group of industrial body. It represents farmers, the seed traders, plant breeders and biotechnology companies. It aims to provide a support for the safe and effective introduction of

GM crops in UK. It provides open information so as to enable proper consumer choice. (JA)

**SCLEROPHYLL FOREST:** A tall open forest dominated by plants such as eucalyptus, which have sclerophyll leaves. These leaves are stiff and toughened with a reduced surface area to minimize water loss in regions of low or irregular rainfall. In Australia such forests are common on the eastern, Tasmanian and southwestern coasts. Dry sclerophyll forests are typically up to 30 meters in height with medium canopy cover, adapted to low nutrient soils, and resistant to fire. Wet sclerophyll forests are typically taller to 60 meters and occur on more fertile soils in moister regions or sheltered valleys. (See EUCALYPTUS) (MP)

**SCNT :** Somatic cell nuclear transfer in which the nucleus of a somatic cell is transferred into an enucleated egg. In some way the nucleus of the somatic cell and the cytoplasm of the egg are able to reprogram and interact to initiate embryogenesis. Dolly the Sheep was born using SCNT technology. (JA).

**SCOPING:** Pre-investigation of the key issues, environmental elements, habitats, stakeholders and boundaries of concern, and the relevance or irrelevance of different factors to the decision-making process involved. (See BASELINE MONITORING, PILOT STUDY, META-ANALYSIS, INTEGRATED MANAGEMENT, ENVIRONMENTAL INDICATORS) (MP)

**SEA LEVEL RISE:** See GLOBAL WARMING.

**SEAGRASS:** Seagrasses (e.g. *Zostera*, *Posidonia* ) are rhizome angiosperm grasses adapted to live underwater in shallow estuaries and sheltered lagoons. Conservation of seagrass beds is important for nutrient productivity and to provide habitat for juvenile fish. Seagrass communities are in serious decline due to human-induced processes like sedimentation and eutrophication, and activities such as trawling. (See ESTUARY, MANGROVE FOREST, BENTHOS, ALGAE, EUTROPHICATION) (MP)

**SEASONALLY AFFECTIVE DISORDER:** Periodic depression which coincides annually with the winter season, often emerging during the long, cold, dark winters of Northern regions. (See DEPRESSION) (MP)

**SECOND WORLD:** Term no longer commonly used in international politics, describing Cold War command economies such as in the former Soviet bloc which collapsed 1989-1991. (See DEVELOPING NATIONS, FIRST WORLD, THIRD WORLD, FOURTH WORLD) (MP)

**SECRET WOMEN's BUSINESS:** See WOMEN's BUSINESS.

**SECULAR ETHICS:** Theories of what is good and bad, or right or wrong, based on criteria other than religious doctrine. ( see ETHICS). (DM)

**SEDA** (see SUSTAINABLE ENERGY DEVELOPMENT AUTHORITY - AUSTRALIA)

**SEED:** A mature ovule, consisting of an embryonic plant together with a store of food, all surrounded by a protective coat. A seed usually develops following the fertilization of an egg cell by a male generative cell from a pollen grain. (DM)

**SEED BANKS:** - A storage facility where the genetic resources of plants are preserved for future use. These seed and germplasm banks are found mostly in university departments and other research institutes. Multinational companies store genetic materials for the development of new plant varieties. (JA)

**SEED TO STOMACH:** Includes the primary production- harvesting of food- food processing, manufacture, distribution and retailing and consumption. (JA)

**SELECTIVE ABORTION :** Abortion of a fetus because it is, or may be, defective. (DM)

**SELECTIVE ADVANTAGE:** An organism's increased probability of reproduction and producing offspring, conferred by its genetic characteristics. (DM)

**SELECTION FOR TREATMENT :** The use of criteria either for choosing patients to be treated when resources are limited, or for choosing patients for whom a particular treatment is efficacious. (See Triage). (DM)

**SELECTION PRESSURE:** The influence of factors extrinsic to an organism (i.e. environmental factors) on its ability to compete with other organisms for reproductive success. (DM)

**SELF:** An individual's unique self-determination, SELF-IMPROVEMENT) (MP)

**SELF AWARENESS:** Self-awareness includes consciousness of: a) Continuity of perception and personality through time; b) Unity of self; c) Embodiment or body image; d) Agency such as free will; e) Awareness of one's own character, strengths, weaknesses, desires and wellbeing. (See CONSCIOUSNESS, SELF) (MP)

**SELF-DISCIPLINE:** The ability to restrain your behavior or emotions (self-control), activate yourself (self-motivation) and direct your own pathway through life (self-determination). (See SELF) (MP)

**SELF-FULFILLING PROPHECY:** Expectations coming true, partly related to subconscious activity, selective perception, and the placebo effect; for example feedback between hypochondria and psychosomatic stress creating a negative effect on physiological health. (See HYPOCHONDRIA) (MP)

## **SELF-GOVERNMENT**

**SELF-IMPROVEMENT:** Sensible conscious improvement of one's status, education, behavior, self-efficient and compassionate whole person. (See SELF) (MP)

## **SELF INTEREST**

**SELF-RESPONSIBILITY** less reliance on the system by owning information so that we can make our own decisions (see RESPONSIBLE )

**SELF-SUFFICIENT:** Having abilities and resources to sustainably provide for oneself without reliance on outside help. (See SUFFICIENCY, SELF) (MP)

**SELFISH GENE THEORY :** See SOCIOBIOLOGY.

**SEMANTICS:** The branch of semiotics which investigates the relation of a sign, usually a word or phrase, to the concept which is being



signified. In other words, semantics is a study of meaning. The term "a semantic difference" is used as a rebuttal to imply that a difference is only verbal therefore irrelevant, but differences in semantics may technically just as easily be significant changes to meaning. (See SIGN, SEMIOTICS) (MP)

**SEMEN:** A fluid consisting of secretions from the male's seminal vesicles, prostate, and from the glands adjacent to the urethra. Semen carries sperm and is ejaculated during intercourse. (DM)

**SEMI-AUTOMATIC WEAPON:** See AUTOMATIC WEAPONS.

**SEMIOTICS:** (Greek: *semeion* "sign") Semiotics or semiology refer to the study of signs, or the ways in which we create meaning in communication. Semiology was coined by Ferdinand de Saussure as a method of cultural analysis, and is a study in which meanings are interpretative rather than truly objective. Linguistics, the study of language, is one of the more formalized and precise branches of semiotics. In our internationalized world of advertising and multimedia, there must be broad consideration of cultural conventions, codes, symbols and multimodal methods of communication. Interpretation of such signs is required to assess the ethics, or lack thereof, which feature in the content and spread of local and global cultures. (See SIGN, SEMANTICS, MULTIMODAL COMMUNICATION) (MP)

**SENILITY :** (Latin *senilis* 'aged') feebleness and deterioration of the body and mind characteristic of old age, dementia or atrophy. Incapacity to exercise informed consent due to impairment of the intellectual faculties. (See MENTAL INCOMPETENCE). (IP)

**SENSES :** In order to live in and to be able to adapt to the external environment, all living organisms must be able to communicate with it. Similarly communication is necessary for the stimulation, regulation and co-ordination of activities within the body. In both cases communication involves a cycle of receiving, collating and giving information. The brain receives communication from the outside the body through the five special senses - sight, hearing, smell, taste and touch. Although the senses are considered different and separate from each other, one sense is rarely used on its own; for example, taste and smell are closely associated with the enjoyment of food. The somatic or common senses originating in the skin are pain, touch, heat and cold. Proprioceptor senses originate in muscles and joints and contribute to the maintenance of balance and posture; that is, pertaining to the sensations of body movements and awareness of posture. Autonomic afferent nerves originate in internal organs and tissues and are associated with reflex regulation activity and visceral pain. Nerve endings are stimulated by phenomena outside the body and the resultant nerve impulses are transmitted to the brain by nerve fibers for 'interpretation' or perception. The brain collates this information obtained from the memory, and the result is coordinated and regulated communication with the outside world (See HEARING, VISION, OLFACTION, TASTE, TOUCH, SOUND). (IP)

**SENSITIVITY ANALYSIS:** A test of the robustness of a management model, statistical method or other decision-making tool, in which a controlled series of changes are made to the input of the process in order to elucidate their effect on the output and proposed solution. The robust model will be able to optimize a solution which is not sensitive to fluctuations from environmental variability or human subjectivity. (See OPTIMIZATION) (MP)

**SENSOR NETWORKS:** Wireless sensors such as tracking bugs or sensory microprocessors can be networked together to provide integrated intelligence for data collection. Further miniaturization of these sensors produces the now commercially available 'smart dust', which wiop

movemenrious privacy concerns. (See SMART DUST, MOTES, BUG, NETWORK, NEURAL NETWORK, BIG BROTHER) (MP)

**SEPPUKU:** See HARAKIRI.

**SERE:** Any of the plant communities in ecological succession, or the types and stages of succession (e.g. hydrosere in water, prisere on bare ground, plagiosere deflected by biota). (See ECOLOGICAL SUCCESSION) (MP)

**SEROTONIN :** See BRAIN NEUROTRANSMITTERS

**Serotonin re-uptake inhibitors :** a growing family of drugs, including sertraline and paroxetine - are significant because they represent a new generation of "designer" antidepressants, created from a knowledge of how the brain works and of the molecular biology of the neuron. Many older antidepressant drugs, particularly the tricyclic family of which imipramine is representative, are diffuse in the regulatory mechanisms they disrupt, disturbing neurotransmission in the dopaminergic, noradrenergic, serotonergic, and even acetylcholinergic systems. It is because of this broad action, and the resulting unwanted side-effects, that while the tricyclins remain effective and economically attractive agents in the treatment of many depressions, they are considered less friendly than the serotonin re-uptake inhibitors. New designer drugs are now appearing that precisely engage both the serotonergic and noradrenergic systems but without the troublesome side-effects of the older tricyclic antidepressants (see PROZAC; BRAIN NEUROTRANSMITTERS; LITHIUM). (IP)

**SEROSTATUS :** Status of infected persons, either sero-positive or sero-negative to tests. (JA)

**SETI (SEARCH FOR EXTRA-TERRESTRIAL INTELLIGENCE):** An astronomic project in which the skies are meticulously scanned for electromagnetic signals which may indicate the presence of intelligent life elsewhere in the galaxy. Pioneered and popularized by Carl Sagan, SETI continues and has expanded to include SETI@home in which special screensavers can utilize unused power from private desktop computers to aid the search for alien broadcasts. (See ALIEN LIFE) (MP)

**SEVEN DEADLY SINS:** In theology, the sins of anger, pride, lust, envy, covetousness, gluttony and sloth. (See SIN) (MP)

**SEVEN LAWS OF NOAH:** A basic set of laws which, according to Jewish tradition, were given to Noah and his family after the Flood. One opinion in the Talmud holds that 6 of these laws were earlier given to Adam. Immediately after the Flood, Noah and his family were the only humans on earth, and so, this set of Seven Laws has global implications according to Talmudic theory. This set of laws was mentioned in the Talmud to explain two areas outside of the framework of Jewish observance: a) the framework of the Jewish people before having received the Torah, b) the framework within which the rest of the world functions. Because each of these seven laws finds parallels in the laws of the Torah, the Seven Laws of Noah thus serve as a common ground between the observance of the Jews and that of the rest of the world, according to this theory. (AG)

**SEVEN WONDERS:** The ancient monuments hailed as the Seven Wonders of the World are the Pyramids at Giza, the Hanging Gardens of Babylon, the Statue of Zeus at Olympia, the Temple of Artemis at Ephesos, the Mausoleum at Halikarnassos, the Colossus of Rhodes, and the Pharos Lighthouse at Alexandria. (See CULTURAL HERITAGE) (MP)

**SEWAGE** : Liquid or solid refuses, either domestic or industrial waste carried off in sewers. (JA)

**SEWAGE EFFLUENT** : Effluent from any sewerage system or sewage disposal works including sullage from open drains (JA)

**SEWERAGE**: The connected system of pipes, plants, infrastructure and activities associated with the collection, treatment and disposal of sewage. Sewerage should thus not be confused with the sewage it contains. The roles of sewerage are to remove sewage from people, to protect natural water resources and to minimize pollution with the aid of sewage processing and treatment. (See SEWAGE) (MP)

**SEX** : (Latin *sexus* 'sex') the sum of the peculiarities of structure, function and chromosomal characteristics that distinguishes a male from a female organism. (See GENDER; HOMOSEXUAL; TRANSSEXUAL; SEXISM; SEXUAL DIMORPHISM; SEXUAL INTERCOURSE). (IP)

**SEX CHROMOSOMES**: The X and Y chromosomes in human beings that determine the sex of an individual. Females have two X chromosomes in diploid cells; males have an X and a Y chromosome. (DM)

**SEX DETERMINATION** : Determination of the sex of a fetus in utero. (DM)

**SEX PRESELECTION** : Choosing the sex of a child prior to conception. (DM)

**SEXISM** : All of the actions and attitudes that relegate individuals of either sex to a secondary and inferior status in society. Sexist attitudes represent a form of social immaturity because individuals are stereotyped according to gender rather than being judged on individual merit. (See RACISM). (IP)

**SEXUAL ABUSE** : illegal sex acts rape, sexual assault or sexual molestation - usually performed against a minor by a parent, guardian, relative or acquaintance. The long-term psychological effect can be devastating, especially if the victim is a child. (See SEXUAL HARASSMENT). (IP)

**SEXUAL DIMORPHISM** : See SEX.

**SEXUAL HARASSMENT** : a type of discrimination consisting of persistent torment, typically but not necessarily at the place of employment. The unsolicited attention comprises of sexual advances, requests for sexual favors and other unwelcome verbal or physical conduct of a sexual nature. Sexual harassment is prohibited by Federal law. (See SEXUAL ABUSE). (IP)

**SEXUAL IDENTITY** : An individual's biologically the expression of one's sexuality at any particular point in time. To what extent one's sexuality is shaped by, and changes in response to the surrounding social and cultural context. (See SEXUAL BEHAVIOR RATING SCALE). (IP)

**SEXUAL INTERCOURSE** : See COITUS.

**SEXUAL ORIENTATION** : Also called sexual preference. A clear disposition and desire for sexual relations with a person of one sex rather than the other; that is, an established pattern of sexual interest, and in most cases sexual activity, directed towards members of the opposite sex, the same sex, or both sexes. Institutional control mandating that all expressions of sexuality have to be channeled through heterosexual patterns has caused much gratuitous violence and oppression of lesbians and gay men. Cultural structures and attitudes dictating compulsory heterosexuality reveal biological ignorance and human intolerance. (See HETEROSEXUAL; HOMOSEXUAL; HOMOPHOBIA). (IP)

**SEXUAL REPRODUCTION**: Reproduction that occurs as a result of the interaction between the two sexes. In plants, sexual reproduction occurs when a female egg cell is fertilized by a male generative cell from a pollen grain. Examples of sexually reproduced plants are corn,

wheat and sorghum. (DM)

**SEXUALITY** : The part that sex plays in human relations. As highly socialized animals, sexuality has a biological importance far beyond its essential procreative purpose and is the reason why women are sexually receptive throughout their menstrual cycles; that is, during fertile and infertile periods. Because the pleasures of sex are largely disconnected from the reproductive purpose, human sexuality affects how we love, how we view ourselves and how we adjust socially. (See SEX; SEXUAL IDENTITY). (IP)

**SHALOM**: ‘Peace’ in the Hebrew language, often used in greeting, as in *shalom aleichem* (‘peace be with you’). The similarity between the words for peace in Hebrew (‘ *shalom* ’) and Arabic (‘ *sal ã m* ’) are perhaps illustrative of the shared history and brotherhood of the Jewish and Muslim peoples. (See SALAAM, SHANTI, PEACE) (MP)

**SHAMAN** : A traditional healer, especially of North Asian origin. The origin of the word "Shaman" is not clear. In Pali, "samana" is a term for a Buddhist monk, and there are several terms resembling "Shaman" in the languages of northern Asia. The north Asian healer who seeks to bring physical and spiritual relief using traditional cures and chants was found to be similar to the functioning of traditional healers in other parts of the world, and so, the term has become generalized to include practitioners of traditional form of healing (especially those which combine physical and spiritual aspects) in various parts of the world. In many shamanic traditions, healing is closely associated with seeing visions, and so, part of the healing method includes techniques which cause the shaman to experience a vision. (AG)

**SHANTI**: *Shanti* is tranquility, or peace, a word known and expressed across the Indian subcontinent. (See TRANQUILITY, AHIMSA, SALAAM, SHALOM, PEACE) (MP)

**SHANTY-TOWN**: Dilapidated housing and home-made shelters in the fringe areas of cities, resulting from urbanization combined with poverty. Shanty-towns and squatter settlements are less developed than adjacent urban areas, often without proper sanitation, waste collection, water, heating, security or opportunity. (See SLUMS, SQUATTER, FRINGE DWELLERS, URBANIZATION, SUSTAINABLE CITY) (MP)

**SHAREWARE**: Shareware and freeware are the distribution of software or open-source materials on a shared-for-all basis. Unlike freeware, shareware programs often only offer limited function or have a time-out mechanism unless the software is purchased. (See SOFTWARE) (MP)

**SI UNITS**: The internationally recognized standards for scientific measurement are the ‘Système International d’ Unités’ (or ‘SI Units’). (See SCALE, MEASUREMENT) (MP)

**SIDDHA** : System of South Indian medicine. This system makes extensive use of metallic and mineral mixtures for treatments. (AG)

**SIDGEWICK, HENRY** : (1838-1900) Victorian philosopher. His work, *Outlines of the History of Ethics for English Readers* (1886), is still useful today. Bioethicists might profitably read it to deepen their understanding of the background to their profession. . (FL)

**SIDS** : See SUDDEN INFANT DEATH SYNDROME.

**SIGN**: (Latin: *signum* ) A sign is a symbol, word, picture or action which suggests the existence of an object, fact, concept or other information. Signification refers to the production of a sign by linking together the signifier (symbol or word) to the signified (the object or concept being described). In medicine, a sign is any objective evidence indicating the presence of disease. In law, to sign is to affix your

signature to a document which becomes evidence of a binding agreement or contract between two parties. To sign is also to use the gestures which comprise sign language for the deaf. Public information signs or signposts should be encouraged to be educational, convey environmental information, warn of dangers, and promote ethical norms of behavior. (See SEMANTICS, SEMIOTICS, DEFINITION) (MP)

**SIGNIFICANCE:** 1. Relevance, importance or the presence of meaningful consequences. For example in environmental impact assessment, the significance of an impact should be estimated for parameters alongside estimates of magnitude and distribution. 2. Statistical significance, such as alpha ( $\alpha$ ) and p-value, are about the potential for experimental errors. (See STATISTICAL SIGNIFICANCE, SIGNIFICANCE LEVEL) (MP)

**SIGNIFICANCE LEVEL:** Significance level refers to the probability of rejecting a true null hypothesis, denoted alpha ( $\alpha$ ) and usually equated with p-value. The significance level can be chosen by the researcher, common percent chance of error). (See STATISTICAL SIGNIFICANCE, STATISTICAL POWER, TYPE I ERROR, ANALYSIS OF VARIANCE) (MP)

**SIGNIFICANT DIGITS:** The significant digits of a measurement are the nonzero digits and any zeros between, but not leading zeroes and not trailing zeroes unless there is a decimal point. (MP)

**SIGHT :** See VISION.

**SIKH :** (from the Panjabi word "sikhna", meaning "studying, learning"). Religious tradition established by Guru Nanak (1469-1539). Ten religious teachers are honored in Sikh tradition. Of these Guru Nanak is the first, and Guru Gobind Singh (1666-1708) is the tenth. It was the decision of Guru Gobind Singh that the "Granth" would function as Guru after him (see Guru Granth Sahib). Sikh tradition places emphasis on universal brotherhood, the unity of God, and forbids alcohol. Vegetarianism is not required, but is widely practiced. (AG)

**SILICON CHIP:** See MICROCHIP.

**SILICOSIS :** A disease which maybe caused by long-term exposure to dust containing silicon compounds. High risk industries are: quarrying for granite, slate and sandstone; mining hard coal, gold, tin and copper; stone masonry and sand blasting; and glass and pottery work. When the silicon particles are inhaled they accumulate in the alveoli in the lungs where some remain and others move out into the connective tissue around the respiratory bronchioles and blood vessels close to the pleura that are responsible for the smooth inflation of the lungs. Larger fibers may form asbestos bodies consisting of cellular material, protein and iron deposits which are surrounded by chronic inflamed tissue due to ineffectual phagocytosis. Progressive fibrosis risk obliterating the blood vessels and respiratory bronchioles causing fibrous adhesions in the pleura which eventually fix the lungs to the chest wall. At this advanced stage gaseous exchange is drastically reduced risking pulmonary hypertension and heart failure. Asbestos-related diseases usually develop after a latent period of 10 to 20 years from exposure but can be much sooner. The types of asbestos associated with risk are crocidolite (blue asbestos), chrysotile (white asbestos) and amosite (brown asbestos). Mesothelioma is cancer of the pleura linked with previous exposure to asbestos dust and may develop after varying duration of exposure to asbestos; for example, 3 months to 60 years with the latent period between exposure and the appearance of symptoms ranging from 10 to 40 years.

The link between inhaled asbestos and fibrosis has only in relatively recent times been studied and occupational risk factors assessed.

Contributing factors to the disease's progression include genetic predisposition to lung disease, high concentrations of pollutants in the air, long

exposure to asbestos and other pollutants, and tobacco smoking. (See METASTASIS, CANCER, SMOKING). (IP)

**SIMIANS** : The monkey species including the great apes. (JA)

**SIMPLEXITY**: 1. Simplexity is an obsolete word for 'simplicity'. 2. It has been revived by Jack Cohen and Ian Stewart to mean the occurrence (or 'emergence') of large-scale simplicity arising from a complex system of rules - similar to 'antichaos' simple behavior in complicated systems. Examples include pi, theorems, laws of nature. Simplexity is also referred to as 'regular emergence' ('super emergence' is expressed in 'complicity'). (See SIMPLICITY, COMPLICITY, COMPLEXITY, EMERGENT PROPERTIES) (MP)

**SIMPLICITY**: Ease of prediction and economy of concepts. The 'Grand Theory of Everything' is the search for ultimate simplicity. (See SIMPLEXITY, PARSIMONY, REDUCTIONIST, COMPLEXITY) (MP)

**SIMULATION MODELLING**: See MODEL TYPES.

**SIN**: Ethically or morally wrong actions, or the omission of actions which ought to be taken. Sinful action or inaction often harms others and may be in violation of natural, human or divine law. Estrangement from religion and God is often considered a sin, and religious philosophy provides guidelines for avoidance and sometimes forgiveness of sin. (See SEVEN DEADLY SINS, ORIGINAL SIN) (MP)

**SINGLE CELL PROTEINS** : Microscopic algal biomass is used in biotechnological process to produce more of pertinacious food materials for human beings. Algal cells like Chlorella and Spirulina. Cultured commercially for their food value, both in fish farming and for human beings. (JA)

**SINGLE-GENE DISORDERS**: Hereditary disorders caused by a single gene (e.g., Duchenne muscular dystrophy, retinoblastoma, sickle cell disease). Compare *polygenic disorders* .

**SINGLE NUCLEOTIDE POLYMORPHISM** : SNPs Pronounced as "Snips" - there are large compendiums of the minute variations in nucleotides (DNA bases). Genetic Variations among these single DNA bases are known as SNPs or SNIPs . Mutation in a single base pair in DNA, used as markers to locate disease genes, non coding region of DNA and not expressed. Can be inherited. (JA+GK)

**SINGLE PARENT FAMILY** : A family made up of only one of both parents and its children. Today, in most single parent families the parent who is missing is the father. Most of these families are to be found in third world countries, where their occurrence is the result of a fatal incident: in many cases the father is missing because he has abandoned his family, in others because he has been killed during war or violence bursts of different sources. Single women can also decide to have children, in which case the single parent family is the result of a choice. (GK)

**SINGULARITY**: 1. A condition of peculiarity, remarkability or individuality; separate or singled out; unique or unitary. 2. Physics: A point where the space-time continuum folds infinitely on itself due to massive gravity, such as a 'black hole' or the 'Big Bang'. (See BLACK HOLE, WORMHOLE, BIG BANG) (MP)

**SITE-DIRECTED MUTAGENESIS:** The modification of a DNA sequence at a location that is precisely controlled. (DM)

**SITUATIONALISM:** The position that ethical action must be judged in each situation guided by, but not directly determined by, rules. (DM)

**SKEW:** A measure of the degree of symmetry of a frequency distribution. Positive or negative skew indicate a bunching up of scores at one end of the scale and a smaller tail at the other end. (See MEASURES OF DISPERSION, KURTOSIS, NORMAL DISTRIBUTION) (MP)

**SLBM :** The nuclear or conventional Submarine-Launched Ballistic Missile (SLBM) is the mobile underwater equivalent of land-launched ICBMs, for example the Polaris, Poseidon and Trident series missiles. (See NUCLEAR SUBMARINE, MISSILES, ICBM, MIRV) (MP)

**SLIPPERY SLOPE :** A phrase from bioethicists' professional slang, it refers to a situation in which one starts by doing something which is morally acceptable, or at worst borderline, and then "slides down the slope" towards doing things which are positively bad. Euthanasia in Holland, for example, is supposed to be allowed under only very strict conditions, including the stipulation that it must be only at the patient's request, and that the patient must be conscious. But it has been debated whether this has led to a slippery slope, which has resulted in a situation where euthanasia has been performed on patients in coma, and on neonates.(FL)

**SLOTH :** Tropical, slow moving, tree dwelling, Eutherian mammals of the order Xenarthra (also known as Edentata). Three-fingered sloths are in the family Bradypodidae. Two-fingered sloths are in the family Choloepidae. (RW)

**SLUMS:** Overcrowded, underdeveloped areas of housing occupied by the poor, unemployed and unemployable. Ghettos and the 'urban jungle' are often irly integrate minority groups, cope with rapid urbanization or provide avenues of escape from poverty. (See SHANTY-TOWN, FRINGE DWELLERS, SUSTAINABLE CITY, STANDARD OF LIVING) (MP)

**SMALL ARMS:** Euphemistic term for automatics, semi-automatics, hand-guns and other handheld weapons which cause innumerable individual instances of killing, terror, threat and theft across the world every day. Much ethically-debatable wealth has been acquired by military-industrial sectors of nations such as the USA, UK, France, Russia, and China who have been among major world-wide distributors of small arms. (See AUTOMATIC WEAPONS, BALLISTICS, NON LETHAL WEAPONS, DISARMAMENT) (MP)

**SMALLPOX :** A viral disease capable of mass destruction, 400,000 people killed in Europe during 19<sup>th</sup> century, contagious, causes prolonged fever and vomiting, prevention by Vaccination (vacca = cow, encowment). (See JENNER, EDWARD). (JA)

**SMART CARD:** Credit card-sized computer intelligence. Smart cards contain a microchip which can store, process and even radio-receive information. They are used for digital cellphone identification, unscrambling subscriber broadcasts, fingerprint storage, medical records, discouraging fraud and of course making credit transactions. Smart card proliferation has provoked ethical debate concerning personal privacy and the over-reliance of humans on technology. (MP)

**SMART DRUGS :** So-called "smart" drugs are tablets which can be bought over the internet or are sold mixed in combination as drinks at clubs and festivals. They contain nutrients, drugs and hormones including, for example, amino acids, enzymes, nootropics (brain metabolism heighteners), choline and acetylcholine precursors (brain neurotransmitters), pyrrolidine derivatives, vasopressin (antidiuretic hormone), hydergine (adrenergic with psychotropic action), herbs, vitamins and glucose. These cocktails are marketed as 'enhancers' of memory,

cognition, learning and intelligence. Although some of these drugs have been used for the treatment of senility and Alzheimer's, there have been scant or no clinical trials of them in (IP+MP)

**SMART DUST:** A new technology which has arisen from wireless communication and the miniaturization of electronics. 'Smart dust' is comprised of many small 'motes', individual sensors or microprocessors able to form an autonomous wireless network enabling integrated 'swarm intelligence' and other emergent landscape can alrhical concerns havs must also be fornd and water. Futuw global informati, MOLECULAR ELECTRONICS, BIG BROTHER) (MP)

**SMART MISSILE:** See AUTONOMOUS WEAPONS.

**SMELL :** See OLFACTION.

**SMITH, ADAM:** See CAPITALISM.

**SMOG :** a combination of smoke and fog in the atmosphere which can in certain industrial environments becomes an extremely toxic mixture due to the inclusion of chemical pollutants existing in air of low quality. (See PHOTOCHEMICAL SMOG). (IP)

**SMOKING :** the deliberate inhalation of noxious fumes or irritating particulate matter from, typically, the burning of tobacco, marijuana, crack cocaine and other "smokable" substances. That cigarette smoking is hazardous is supported by a plethora of scientific evidence, in which cigarette smokers have a) substantially higher rates of death from disabilities such as lung cancer, emphysema, chronic bronchitis and coronary disease b) women who smoke during pregnancy risk giving birth to babies of low birth weight where the deleterious effects of smoking extend into the neonatal period because the habit significantly influences lactation. Epidemiological studies have also demonstrated that passive smoking increases the incidence of respiratory disease among non-smoking members of families of smokers. Most western societies ban the sale of cigarettes to minors and follow a policy of mandatory display of health warnings on tobacco products. Smoking is also now prohibited in many airlines, restaurants, office buildings and other public places, which sometimes have dedicated areas for smokers. Typically, the drugs inhaled such as nicotine, cannabis and cocaine are highly addictive thus it is a big ask for the addicted to quit even if strongly motivated to do so. Increasingly smokers succumbing to tobacco-related diseases, or their families, are successfully suing tobacco companies for damages. (See PASSIVE SMOKING, QUIT SMOKING, ADDICTION, COCAINE HYDROCHLORIDE, NICOTINE, CANNABIS, INTRAUTERINE GROWTH RETARDATION, LOW BIRTH WEIGHT, SUDDEN INFANT DEATH SYNDROME, XENOBIOTIC). (IP+MP)

**SNPS:** See SINGLE NUCLEOTIDE POLYMORPHISM.

**SNIPs:** See SINGLE NUCLEOTIDE POLYMORPHISM .

**SOCIAL AND BEHAVIORAL SCIENCES :** approaches that see human behavior as a manifestation of underlying mental configurations. In the modern context, the discipline has its roots in animal behavioral studies and avoids notions of genetic determinism (see HUMAN BEHAVIORAL ECOLOGY AND GENETIC DETERMINISM). (IP)

**SOCIAL CLASS:** See CLASS, CASTE SYSTEM.

**SOCIAL DARWINISM:** 'Social Darwinism' is a domain of social philosophy based on Charles Darwin's evolutionary theories, developed by sociologist Herbert natural selection in biology and the evolution of human tructures, elitism and eugenics. (See CULTURAL EVOLUTION,



MEMETICS, NATURAL SELECTION, EVOLUTION) (MP)

**SOCIAL INFERTILITY:** See INFERTILITY.

**SOCIAL STATISTICS:** See CENSUS.

**SOCIALISM** : The core idea of socialism, in its democratic form, is that the working classes; that is, the majority, should form an extensive system of government which aims at securing all citizens the right to the equal satisfaction of vital needs. The purpose of socialist health care policy, for example, is to provide the citizens with all the medical treatments and other health-related services that they genuinely need. In this model all aspects of health care policy-making should be controlled democratically; that is, by the representatives of the people. Private citizens can often make ethical decisions when it comes to choices between treatment and non-treatment, or between two alternative lines of therapy. However, these decisions take place in the framework of a centrally controlled health-care system where no one's needs are allowed, in theory, to trump anybody else's. (See COMMUNITARIANISM; LIBERTARIANISM; LIBERAL UTILITARIANISM; UTILITARIANISM; DEMOCRACY). (IP)

**SOCIETY** 1. an enduring and co-operating social group whose members have developed organized patterns of relationships through interaction with one another. 2. a community or broad grouping of people having common tradition, institutions and collective activities and interests; for example, the societal approach to bioethics takes into consideration whole communities, their culture or natural environment and long-term effects of decisions on matters of value. (IP)

**SOCIOBIOLOGY** : the study of the biological basis of social behavior in animals, including human beings. Viewing social behavior from a biological standpoint offers insights into behaviors such as sexism, nepotism, altruism, parenting and conflict. The contribution of E.O. Wilson was crucial to the development of the science as previously sociobiology was a loose amalgam of evolutionary theory, ecology and animal behavior (see SOCIOLOGY, SPERM COMPETITION, HUMAN BEHAVIORAL ECOLOGY). (IP)

**SOCIOGRAM:** A graphical representation of the relationships among a group of people. (See MODELING) (MP)

**SOCIOLOGY** : the branch of science devoted to the development, nature and laws of human society (see SOCIOBIOLOGY and HUMAN BEHAVIORAL ECOLOGY). (IP)

**SOCIOLOGY OF MEDICINE** : The social structure of medical institutions or the medical profession. (DM)

**SOCRATES** (469-399 BC): A Greek philosopher, the teacher of PLATO (q.v.) Socrates spent his days discussing philosophy in the marketplace in Athens. His *Socratic method*, of teaching by asking questions and bringing out the latent knowledge of his students, might be profitably adopted by academic bioethicists and by clinical ethics who lead physicians and nurses in clinical discussions. He was eventually condemned to death on three charges: denying the gods of Athens, introducing new gods, and corrupting the youth. His defence, the *Apology*, along with the *Crito* and the *Phaedo*, all dialogues written by Plato which describe the period leading up to his execution, are classics of ethical philosophy. In the *Phaedo* he argues that death is better than life, because in life we know only illusory shadows, but in death we come face-to-

face with truth, which is what philosophers have been seeking all along. Some advocates of suicide and euthanasia have tried to honour Socrates by naming a society after the hemlock, which Socrates was sentenced to drink. But this is a misunderstanding, because Socrates was against suicide. He argued that even though the next life is better than this one, we have no right to leave this life early. We belong to the gods, who sent us here, and we must remain here until we are forced to leave.

Socrates in the *Phaedo*, advocates REINCARNATION (q.v.), but in a cruder and perhaps more primitive version than that of Hinduism and Israeli Kabala. He also believed in a kind of god, a *daemon*, which was his conscience and told him what was right and wrong for him to do. Although philosophy is sometimes thought of as a totally rational, secular pursuit, these are two examples of how great philosophers have mixed rationality with mysticism. (FL)

**SOE REPORT:** See STATE OF THE ENVIRONMENT REPORT.

**SOFT ENERGY:** Renewable and sustainable energy sources such as solar, wind, ocean and geothermal energies. *Soft Energy Paths* by Amory Lovins focused attention on the social and technological structure of the energy system. (See SOFT TECHNOLOGY, RENEWABLE ENERGY, HARD ENERGY) (MP)

**SOFT POWER:** 'Soft' power to promote persuasion and legitimacy. Traditional 'hard' power increase the influence of a country (examples perhaps include the Netherlands, Scandinavia and Canada) beyond its political or military capacity. (See DOVE, HARD POWER) (MP)

**SOFT TECHNOLOGY:** Technology which has low or negligible resource use, efficient energy consumption and minimal pollution, often involved with sustainability, renewable resources, green science, education, health, services and information industries. Soft technology is associated with 'soft power' and 'soft energy'. (See HARD TECHNOLOGY, SOFT POWER, SOFT ENERGY, CLEAN PRODUCTION) (MP)

**SOFTWARE:** The programming (non-hardware) side of computers; including computer languages, operating systems, programs, computer viruses and the Internet. Software may be free (freeware), a limited demo (shareware), illegal (pirate copy) or a legally purchased program. As an aside, software enthusiasts also use the slang 'wetware' to mean the brain and human users/designers of the system. (See PROGRAM, SHAREWARE, HARDWARE) (MP)

**SOFTWOODS:** Soft and easily-worked but strong timbers, or the gymnosperm coniferous trees yielding such wood. Softwoods such as pine trees comprise the majority of building timbers, and also produce resins, tannins and turpentine. (See HARDWOODS) (MP)

**SOLAR ENERGY:** See RENEWABLE ENERGY.

**SOLIDARITY:** (Latin: *solidus* "solid") Union or fellowship between members of a group or between peoples of the world. Individuals in solidarity with one another are firmly united by common responsibilities and interests, and undivided in opinion, purpose and action. (See UNITED, UNITY) (MP)

**SOLITUDE:** (Latin: *solus* "alone") An experience in which you are solitary, secluded or alone. It need not be lonely in solitude if there is internal connection and comfort with your own company. Human company is necessary to wellbeing, but so is enjoyment of your own inner resources - without seeking or pining for others, planning social events, or using such things as television in avoidance of solitude. (See LONELINESS) (MP)

**SOLSTICE:** (Latin: *solstitium* from *sol* 'sun' + *stit* 'make stand') Either times of the year (summer or winter) when the Sun is furthest from the equator or vertically overhead at the Tropic of Capricorn (21 December) or the Tropic of Cancer (21 June) and appears to pause before returning [Latin *solstitium* or *sol* = sun + *stit* make stand] (see EQUINOX). (IP)

**SOLVENT ABUSE :** The deliberate inhalation of vapors from solvents, thinners, adhesives, lighter gas or petrol products, for their intoxicating or narcotic effects. Drug dependency and tolerance are usually accompanied by brain, liver and kidney damage, and possibly accidental death. Solvent abuse is typically linked to poverty and social alienation as seen in the US with black street kids sniffing glue or Australian Aboriginal children sniffing petrol. It is a terrible indictment on our societies that people should be both so desperate for escape and so poverty-stricken that they resort to such dangerous behavior. (See JUNKIE, ADDICTION). (IP+MP)

**SOMA:** 1.(Greek: *soma* "body") The body of an organism, as distinct from the germ cells. (See SOMATIC CELLS). 2. (Sanskrit) An intoxicating plant juice sometimes ingested as a drug in traditional Vedic rituals. 3. A tranquillizing drug used in Aldous Huxley's fictional dystopia *Brave New World* as a willing form of social control. (See HUXLEY) (MP)

**SOMATIC CELLS:** Any cells in the body except reproductive cells and their precursors. (Soma = body) cells found in the body of an organism - Other than germ cell. (DM, JA)

**SOMATIC-CELL GENE THERAPY :** A technique that involves injection of 'healthy genes' into the bloodstream of a patient to cure or treat a hereditary disease or similar illness. A clinical application of gene therapy may be found in the treatment of genetically determined diseases such as thalassemia or cystic fibrosis. (See GENE THERAPY; *IN UTERO* GENE THERAPY; GERM-LINE GENE THERAPY). (IP)

**SOMATIC HYBRIDS:** See CELL FUSION.

**SOMATIC NUCLEAR TRANSFER:** See NUCLEAR TRANSFER.

**SOMATOTROPHIN:** Growth hormone. (See bST, HGH). (DM)

**SONAR:** (Abbreviation for 'SOund Navigation And Ranging') Sonar is the utilization of echo-location using underwater sound waves, such as by whales and submarines. (See LOW FREQUENCY ACTIVE SONAR, RADAR) (MP)

**S O S :** An international distress signal or call for help. It is signified in Morse Code as repeats of three dots, three dashes, three dots ( - - - ). Although chosen for its simplicity of transmission, folk etymology takes it to be an abbreviation of "*Save Our Souls*". (IP & MP)

**SOUND :** sound starts when some mechanical disturbance produces vibrations. These vibrations are transmitted through some medium (usually air) in the form of tiny collisions among the molecules in that medium. If the acoustic energy is sufficiently strong, these vibrations may trigger a chain of events culminating in an auditory sensation. Acoustic energy may be transmitted through any medium as long as its constituent molecules are sufficiently close together to collide with one another when they are set in motion. The more densely these molecules are packed, the faster sound will travel through them. For example, at room temperature airborne sound travels 340 meters per second but in the denser medium of water, sound travels about 1,500 meters per second. (See HEARING, SENSES). (IP)

**SOUTH:** A term used in international political economics to refer to the Third World, consisting of the developing countries which are

comparatively less advanced in terms of wealth and welfare. These countries are generally to be found in the Southern Hemisphere, for example Africa, South America and parts of Asia. (See DEVELOPING NATIONS, NORTH, THIRD WORLD) (MP)

**SOUTHERLY BUSTER** a surge of cool air that moves rapidly northwards along the Australian East Coast. It is often accompanied by squalls and rapid drops in temperature (see DUSTSTORMS & PHOTOCHEMICAL SMOG). (IP)

**SOUTHERN OSCILLATION INDEX** refers to high and low fluctuations in ocean currents, atmospheric pressure, wind and rainfall in the equatorial Southern Pacific regions and are caused by differences in ocean temperatures between the east and west tropical Southern Pacific. Fluctuations in the current's intensity are called Southern Oscillation or *El Nino* -Southern Oscillation (ENSO) events. Researchers have yet to discover the causes of abrupt climatic shifts, and until they do the situation leaves us in limbo with regard to climatic predictions. It is possible that large-scale reorganizations of the ocean's circulation following atmospheric triggers may be invs and change the weather patterns that depend on it (see *EL NINO* -SOUTHERN OSCILLATION PHENOMENON & *LA NINA* -SOUTHERN OSCILLATION PHENOMENON). (IP)

**SPACE:** Often generalized to mean the environment outside our cozy Earth and its habitable atmosphere, 'space' is in fact the fundamental scalar structure within which elements of the universe are organized. Space was demonstrated by Einstein's Special Theory of Relativity (1905) to be linked to the dimension of time, and by his General Theory (1915) to be 'curved' around axis), left/right (east/west, x-axis), in/out (altitude/depth, z-axis) and before/after (time dimension). (See SPACE-TIME CONTINUUM, SCALE) (MP)

**SPACE DEBRIS** : The Earth's orbit is increasingly littered with disintegrating pieces of past space missions, satellites and spent parts, a hazardous and long-lasting collection of high-velocity projectiles known as space debris or 'space junk'. Although the risk is minimal of death from descending debris (such as the US space station Skylab which crash-landed over Australia), there may be significant impact risk to astronauts, whether during spacewalk or inside the Space Shuttle or International Space Station. Regulation and restriction of such pollution will leave space a less dangerous place for the explorations of our descendants. (See INTERNATIONAL SPACE STATION) (MP)

**SPACE EXPLORATION:** From the first satellite launched into orbit ( *Sputnik* 1957), the first man in space (Yuri Gagarin 1961), through the *Apollo* missions to the Moon (Neil Armstrong 1969), to modern satellite communications and the International Space Station, an intrinsic human pioneering urge has been at play. Exploration of the solar system with probes, often in the search for life, has now included most planets and many significant satellites. Examples include Saturn (e.g. *Voyager*, *Cassini* ), Jupiter (e.g. *Voyager*, *Galileo*, *Pioneer*), Venus (e.g. *Venera probes* , *Pioneer Venus*) and the exploration of Mars (e.g. *Mariner*, *Viking*, *Sojourner*, *Global Surveyor* , *Pathfinder* , *Odyssey*, *Express* and *Nozomi* missions). The Space Shuttle has proved a boon for transportation and experimentation, despite the hazards epitomized by the Space Shuttle Challenger (1986) and Columbia (2003) disasters. America has not been the only country to use space shuttle technology, for example the Soviet shuttle *Buran* . Concern must be raised over US plans to weaponize satellites or space vehicles. Space exploration agendas include the step-by-step assembly of the International Space Station. The search for extraterrestrial signals continues, with the use of ground and orbital optical and radio-telescopes and projects such as SETI. Projecting far forward to when the Sun finally expands to engulf the Earth's orbit, the biosphere (perhaps even the descendants of humans) will either have to move the Earth, or colonize space to survive. Future

technology may not find it so hard to colonize space - digital life, or replicating interstellar spacecraft sometimes referred to as Von-Neumann probes. These probes, perhaps containing the genetic blueprint for restructuring the intelligence (or whonet) that created it, may be able to colonize the known universe relatively quickly using the power of exponential increase by replication. (See EARTH FROM SPACE, INTERNATIONAL SPACE STATION) (MP)

**SPACE-TIME CONTINUUM:** Albert Einstein's Special Theory of Relativity calls for time to be the fourth dimension of three-dimensional space. This is together known as the 'space-time continuum' or 'four-dimensional continuum'. (See SPACE, SINGULARITY, MATTER) (MP)

**SPACE-TIME MODEL:** A model of a process which forecasts changes to a variable in space and in time, e.g. distribution of population, spread of disease etc. (MP)

**SPACE WEAPONS:** It may not be a great step from the peaceful conquest of space to the conquest of the Earth from space - obviously the rocket and missile industries are very close. The US has discussed proposals for a 'Space Corps' (to complement the Army, Navy and Marine Corps) and weaponizing the Space Shuttle (to shoot down communications and spy satellites). Descendants of the 'Star Wars' missile defense system may involve weaponized satellites, for example with earth-targeting lasers. There must be debate and concerted effort *now* if space is to be preserved as a weapons-free zone of peace and unity as inspired by the International Space Station and the fragile Earth viewed from space. (See MISSILE DEFENSE, LASER WEAPONS, NANOTECHNOLOGY WEAPONS, SPACE EXPLORATION) (MP)

**SPACESHIP EARTH:** (See EHRLICH, PAUL)

**SPC :** Single Cell Proteins e.g. Algal cells like Chlorella and Spirulina. Cultured commercially for their food value. (JA)

**SPECIALIZATION:** (See OVERSPECIALIZATION, MULTIDISCIPLINARY)

**SPECIATION:** Evolutionary process involving the formation of a new species. (See SPECIES, EVOLUTION, NATURAL SELECTION, PUNCTUATED EQUILIBRIUM) (MP)

**SPECIES:** Taxonomic category subordinate to a genus composed of individuals with common characteristics that distinguish them from other groups of the same taxonomic level; in sexually reproducing organisms, a group of interbreeding natural populations that are genetically distinct from other such groups. The most objective level in the classification of organisms. For extant, sexual species, a species is defined as the collection of individuals capable of breeding among themselves and producing viable offspring. This definition has problems. For example, in captivity it produces a wider definition, i.e. smaller number of 'species', because of successful breeding between different 'wild species', e.g. successful breeding between closely related species of wild duck. For organisms that reproduce asexually, e.g. many species of dandelions (*Taraxacum* spp.) and brambles (*Rubus* spp.), and for fossils, a more subjective criterion of morphological similarity is used. (DM, JA, MR)

**SPECIES BARRIER:** The idea that there is a natural barrier between species that preserves their integrity or identity. This idea has no known foundation in biology. The parameters that limit the ranges and variations of species are fluid and variable, and species exist as reproductive

communities rather than as separate creatures. (DM)

**SPECIES DISTRIBUTION:** See POPULATION DISTRIBUTION.

**SPECIES INTEGRITY:** The idea that a species has integrity as a biological unit. This would have to be based on the identity of the genetic material carried by the species. However, it is not clear how a species might be defined genetically, and this issue is the subject of debate among those seeking to understand the nature of species. (DM)

**SPECIESISM:** Term coined by Richard Ryder to be suggestive of 'racism' and 'sexism'. An action or attitude is speciesist if it treats or considers a non-human to deserve particular (lesser) treatment purely by virtue of its not being HUMAN (q.v.). So, for example, while it could be argued that it would not be speciesist to deny chimpanzees the right to vote in elections while allowing this right to humans (on the grounds that chimpanzees lack the necessary mental capacities to make such choices) it could be argued that it would be speciesist to hold that chimpanzees but not humans may be used in painful medical experiments (since humans and chimpanzees probably have much the capacity to feel PAIN (q.v.)). (MR)

The term widely used by Peter Singer, in his arguments for animal rights. It is argued that preferring the good of the human species to that of others, is to be compared to *sexism*, preferring the good of one's own sex, and to *racism*, preferring the good of one's own race. It is sometimes argued that Darwinism proves that speciesism is wrong, because Darwin showed that the human species is not unique and separately created. The animals, indeed all of nature, and we are really one family. This argument, however, misses the point that Darwin's mechanism of evolution is predicated on the *struggle for survival*, in which each organism strives to survive and to reproduce, at the expense of others. Surely what is good for one's own species, at the expense of others, is good for one's own survival and ability to reproduce. So Darwinian evolution is predicated on the assumption that organisms are speciesist. (FL)

**SPEECH RECOGNITION:** Speech recognition refers to computer-comprehension of human language when spoken. Voice recognition can be used for security identification using individual accent, tone and speech patterns. More commonly it refers to the recognition of human speech for computer command and note dictation. Stages in the programming development of voice and speech recognition include phonetic recognition (matching pronunciation and filtering of nonsense like "um"), prosodic analysis (tone recognition), language models (sentence probability), syntactic analysis, semantic analysis, context evaluation, translation and speech synthesis. The progress of voice recognition software to consumer standard may increase the ease and diversity of written publishing. (See TRANSLATION SOFTWARE) (MP)

**SPEED** : 1. Velocity, or distance traveled per unit of time. Speed is one of the three major killers on the roads, along with drink-driving and fatigue. 2. The street name for amphetamine, a stimulant recreational drug. (See AMPHETAMINES). (IP+MP)

**SPEED READING:** See READING

**SPERM:** The male reproductive cell, or gamete. Normal sperm have typically, for humans short tail symmetrically oval heads, stout midsections, and long tapering tails. (DM)

**SPERM BANK:** A place in which sperm are stored by cryopreservation for future use in artificial insemination. (DM)

**SPERM COMPETITION:** Where more than one male mates with a single female within a short period of time a fertilization contest, or sperm competition, is promoted. Sperm competition does occur in humans and has been a selective force in the evolution of certain human

characteristics, in particular the common (monogamous, serially monogamous, polygamous, promiscuous, or a mixture of these) sexual inclinations of males and females. Thus fitness, as mediated by natural selection, is not limited simply to factors relating to the structure and function of a body but also includes complex social behaviors (see SOCIOBIOLOGY; ADULTERY). (IP)

**SPERMATOOA:** See SPERM.

**SPINA BIFIDA:** A congenital defect caused by the failure of the neural tube to close thus disrupting the normal development of the overlying vertebral arch rudiments so that they fail to fuse along the midline to enclose the vertebral canal. The resulting gap in the vertebral canal varies in degree with the clinical consequences ranging from mild to fatal. The condition occurs approximately 10 to 20 times per 1000 births (see FOLIC ACID). (IP)

**SPINOZA , B (1634-1677):** Baruch (Benedict) Spinoza was a Dutch Jew of Portuguese descent, who was expelled by the Jewish community, for reasons which have never been perfectly clear. Some interpreters regard him as a Jewish philosopher, by others as an atheist and by others as a Christian. His philosophy was a kind of PANTHEISM (q.v.). God has infinitely many attributes, of which Extension (the material) and Thought (the mental or spiritual) are only two. This means that in addition to matter and spirit, there are infinitely other different kinds of things. God is not personified in any way, but being infinite God includes everything, and does everything which it is possible to do. If there is something, which God does not do, that thing must be impossible. For if it were possible and God did not do it, this would be a limitation to God's infinity. Since God does everything, which is possible, there is no leeway for free choice, even on God's part. God does everything from absolute necessity. It naturally follows that we, who are merely aspects or what Spinoza calls *modes* of attributes of God, don't have free choice either, but do everything from necessity. This DETERMINISM (q.v.) leads to a mental acquiescence, an accepting attitude towards all that happens, and a willingness to forgive those who have hurt us, because we are aware that they acted with no free choice. (FL)

**SPOUSAL NOTIFICATION :** The reporting of a woman's abortion request to her spouse. (DM)

**SPUTNIK :** Heralding the age of access to space and its exploration, Sputnik I, launched in October 1957 from the Soviet Union, was the first monitored satellite launched into orbit by humans. (See SATELLITE, SPACE EXPLORATION, PIONEER, VOYAGER, INTERNATIONAL SPACE STATION) (MP)

**SQUATTER:** A homeless person who takes up illegal residence on the private property of another person. (See FRINGE DWELLERS) (MP)

**SS :** (German: Schutzstaffel 'protection squad') Nazi party paramilitary group under Hitler in World War II, including the Gestapo, concentration camp officers and combat troops (the Waffen-SS). (See NUREMBERG TRIALS) (MP)

**SSBN :** See NUCLEAR SUBMARINE.

**STAKEHOLDERS:** Each person/group/institution/constituency likely to be affected by a decision and with a moral claim on the decision-maker. It reinforces one's obligation to make all reasonable efforts to foresee possible consequences and take reasonable steps to avoid unjustified harm to others. (JA)

**STANDARD DEVIATION:** A frequently used statistical measure of dispersion, the standard deviation is the 'average' distance of the individual data points from the mean. This 'root mean square' of the deviation (See MEASURES OF DISPERSION) (JA & MP)

**STANDARD ERROR:** The ‘standard error of the mean’ is the standard deviation of the sample means. (See STANDARD DEVIATION) (MP)

**STANDARD OF LIVING:** ‘Standard of living’ is a measure of living systems. The of life may include:

- a) Basic needs: fresh water, food, shelter, energy, security;
- b) Emotional needs: love, family, friends, spirituality, happiness, social opportunities;
- c) Societal needs: healthcare, education, employment, infrastructure, balanced media, inspiring entertainments, protection & access to natural environments etc.;
- d) Health indicators: life expectancy, child mortality, disease epidemiology, medical availability, health equity etc.;
- e) Education indicators: basic literacy, computer literacy, primary/secondary/tertiary education enrolment, participation in the information economy etc.
- f) Economic indicators: income, costs of living, wealth distribution, housing, production, consumption, cars/TVs/computers etc. per person;
- g) Human rights, responsibilities and political freedoms.

(See QUALITY OF LIFE, WELLBEING, HAPPINESS, PROGRESS, DEVELOPMENT, GENUINE PROGRESS INDICATOR, HUMAN DEVELOPMENT INDEX, OVERDEVELOPED COUNTRY) (MP)

**STANDARDS OF PRACTICE:** A set of criteria against which the implementation of a set of procedures or other professional practices can be measured. Examples include international standards for Environmental Impact Assessment, or the American Nurses Association Standards of Practice. (See ENVIRONMENTAL IMPACT ASSESSMENT, ENVIRONMENTAL CODES OF CONDUCT) (MP)

**STAR WARS PROJECT:** See MISSILE DEFENSE

**STATE INTEREST :** The concern of the state, within constitutional limits, to protect legal incompetents, public health, public safety, and the general welfare. (DM)

**STATE MEDICINE :** A system of health care financed and controlled by the Government. (DM)

**STATE OF THE ENVIRONMENT REPORT:** A systematic review of a country, state or region, which reports on the condition of the environment. State of the Environment (SoE) reporting has become normal accepted practice in all European and OECD countries. For example, most member states use pressure/state/response models which are reviewed by the OECD. SoE Reports need to be encouraged in all countries and across all political and bioregional scales. There is a need to develop the methodology into a standardized, quantitative, inclusive set of indicators for trend analysis. SoE reporting should be integrated with other related activities such as State of the Marine Environment reports, environmental impact assessment, local environment studies and government policy. This fosters socio-ecological awareness, evidence-based management, regional sustainable development, informed national responsibility and international co-ordination for the monitoring the sustainability of the global environment. (See PRESSURE/STATE/RESPONSE MODEL, ENVIRONMENTAL IMPACT ASSESSMENT) (MP)



**STATISTIC:** A descriptive measurement of a sample, creating a numerical "fact", which is really only an estimate of the true population parameter. (See PARAMETER, STATISTICAL POPULATION, SAMPLE) (MP)

**STATISTICAL DESCRIPTION:** Measurement, quantification, descriptive analysis and graphical summary of populations of data. (See MEASUREMENT, MEASURES OF CENTRAL TENDENCY, MEASURES OF DISPERSION) (MP)

**STATISTICAL INFERENCE:** Inference is the primary purpose of statistics; i.e. to estimate or predict the parameters of a population or set, based upon statistical operations on a random or representative sample taken from that set. (See STATISTICS, SAMPLE) (MP)

**STATISTICAL POPULATION:** In statistics the term population does not necessarily have reference to numbers of people. The population is the total set consisting of any and all items of interest to a statistical problem. (See PARAMETER, STATISTIC, SAMPLE) (MP)

**STATISTICAL POWER:** A measure of the statistical ability of an experimental design to come up with the correct solution. Statistical power is the probability of correctly rejecting a false null hypothesis: power equals one minus beta ( $1 - \beta$ ), where beta is the probability of Type II Error, or accepting the null hypothesis when it is false. (See STATISTICAL SIGNIFICANCE, SCIENTIFIC METHOD, NULL HYPOTHESIS) (MP)

**STATISTICAL SIGNIFICANCE:** Statistical significance determines the probability of making a Type I Error (alpha:  $\alpha$ ) or Type II Error (beta:  $\beta$ ) in a significance test or hypothesis testing. Significance level is commonly set at  $P=0.05$ . (See SIGNIFICANCE LEVEL, STATISTICAL POWER, TYPE I ERROR, TYPE II ERROR) (MP)

**STATISTICS:** (New Latin: *statisticus* "affairs of the State") The branch of mathematical science dealing with the collection, quantification, interpretation and use of data on any subject. Statistics are principles and processes for extracting useful information from a set of data, and may be divided into two classes: descriptive statistics used to summarize and characterize the data (e.g. means, variances, tables, graphs) and inferential statistics for estimation and interpretation of population parameters from a sample. (See STATISTICAL POPULATION, STATISTIC, SAMPLE, PARAMETER, MEAN, VARIANCE, ANALYSIS OF VARIANCE) (MP)

**STATUS QUO** "*state in which*" in Latin; that is, the existing condition or state of affairs. (IP)

**STATUTE:** Legislation enacted by a legislature. (DM)

**STATUTE LAW** the law established by legislative enactment (see COMMON LAW)

**STATUTORY RAPE** sexual relations with a female who has not yet reached the statutory age of consent which is, in the majority of industrial countries, 18 years. (IP)

**STEERING COMMITTEES**

**STEM CELL (SC):** Undifferentiated cell precursor to a number of differentiated (specialized) cell types, found in both tissues of adult and embryos. Many kinds, totipotent, pluripotent, unique property, like in dividing cells some daughter cells differentiate into specific cell type (brain, blood) while other remain as SC, do tissue repair and cell replacement, essential for life, eg. renewal of vital tissues. Embryonic stem (ES) cells found in early stages of embryonic development retain their extraordinary ability to differentiate into any other cell type. Eg. heart,

muscle, blood (ES cells) (See Embryonic germ cells). Hematopoietic stem cells are a type of SC found in blood. Sources 1. Aborted human fetal tissue, 2. Human embryos produced in IVF treatment, but embryos produced by nuclear transfer (cloning technology). (See EMBRYONIC STEM CELLS). (JA+IP)

**STEWARDSHIP** (Old English: *stigweard* "house warden") 1. To hold in trust the management of another's property 2. The belief that it is humanity's duty and responsibility to conserve and protect our planetary life-support systems prudently and conscientiously. In the words of the *World Conservation Strategy* (IUCN, 1980): "We have not inherited the Earth from our parents, we have borrowed it from our children". (See SUSTAINABLE DEVELOPMENT). (MP & IP)

**STENOTYPIC SPECIES:** A species with a low tolerance to environmental change, typically with only localized distribution covering a small environmental gradient. Stenotypic species may be more vulnerable and subject to conservation requirements. (See EURYTYPIC SPECIES, ENVIRONMENTAL GRADIENT) (MP)

**STERILIZATION (SEXUAL):** Procedures that render individuals incapable of reproduction. (See CONTRACEPTION). (DM)

**STIGMA:** (Greek: *stizein* "tattoo") 1. A distinguishing mark of shame or social disgrace, for example the stigma of having committed adultery or having been in prison. Social stigmas should not be used against a person, since forgiveness and the benefit of the doubt allow room for personal progress and redemption. 2. In biology, the female organ of a flower which receives the pollen, or the respiratory spiracle of an insect. 3. In Christianity, a mark resembling a crucifixion wound of Jesus. (See STIGMATA) (MP)

**STIGMATA:** (Greek: *stizein* "tattoo") Marks, sores or bleeding from the hands or feet in the same locations as the nail wounds sustained by Jesus Christ on the cross. Sometimes these marks are inflicted during religious passion or as a result of ceremonial crucifixion. Although rarely seen or proven, spontaneous appearances of stigmata have been alleged as evidence of divinity. (See STIGMA) (MP)

**STIGMATIZATION :** Negative labeling of an individual or group. (DM)

**STOPGAP MEASURES :** Programs during emergency circumstances which mitigate, minimize or delay impending socio-ecological disasters - last-minute impositions attempting to substitute for good planning, precaution and long-term politics. (See PRECAUTIONARY PRINCIPLE, STRATEGIC MANAGEMENT, INTEGRATED MANAGEMENT) (MP)

**STR (short tandem repeat):** di, tri or tetra nucleotides repeated in tandem. These sequences are best studied by PCR (polymerase chain reaction), but even so, the very short or large STR alleles are difficult to discriminate one from the other. Therefore, the limit of resolution of STRs is usually between 12 to 40 CA/GT repeats, and tetranucleotide repeats are more and more used in routine forensic analyses in order to improve the informativeness of the system (See MICROSATELLITE, FORENSIC DNA) (GK)

**STRATEGIC DEFENSE INITIATIVE:** See MISSILE DEFENSE.

**STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA):** The Environmental Impact Assessment of policies, plans and programs. Policies are the guiding principles, while plans and programs are the co-ordinated objectives and proposed sets of actions leading to projects, which typically require environmental impact assessment. The formal systematic analysis of these earlier stages of the development process

can help to improve the sustainability, comprehensiveness, cost-effectiveness and accountability of the decision-making process. (See ENVIRONMENTAL IMPACT ASSESSMENT, STRATEGIC MANAGEMENT) (MP)

**STRATEGIC MANAGEMENT:** Strategic planning and management refer to the processes of decision-making and organization which determine the appropriate direction and focus of a company, society or ecosystem. Seminal corporate strategy theorists include Kenneth Andrews, Alfred Chandler Jr and H. Igor Ansoff. Strategic planning requires an overview of principles, goals, objectives, methods, functions, and purpose within an ethical and environmental context. Strategic management is integrated, precautionary, pro-active, flexible and adaptive. In the context of business strategy this requires an understanding of the competitors, consumers, technologies, market niches, growth opportunities, corporate resources, leadership, professional values and social obligations. In the context of environmental strategy this includes processes, flows, interactions, impacts, issues, achievements, land-users, public preferences and the factors creating change. The use of a balanced systems approach, cost-benefit analysis, scientific methods, planning models, game theory, risk assessment, best available information, current best practice, evidence-based management, environmental impact assessment and strategic environmental assessment all help to determine where, when and how high to aim, and how to secure the attainment of planned results. (See STRATEGY, INTEGRATED MANAGEMENT, ADAPTIVE MANAGEMENT, SUSTAINABLE MANAGEMENT, EXPERTISE, BEST CURRENT PRACTICE, BEST AVAILABLE INFORMATION, VISIONARY COMPANY) (MP)

**STRATEGIC PLANNING:** See STRATEGIC MANAGEMENT, STRATEGIC ENVIRONMENTAL ASSESSMENT.

**STRATEGIC STUDIES:** The branch of international political studies which examines the ways in which states achieve their political objectives through the threat or utilization of military force. The traditional field of war studies has in the modern context been broadened to security studies, which includes peace negotiation and enforcement, diplomatic and economic measures, and terrorism or other non-state players in the international field. (MP)

**STRATEGY:** (Greek: *strategos* "a general") The direction and control of large-scale operations, commonly in the context of military planning and war conduct. This is distinct from tactics, which are smaller-scale stratagems in the presence of battle. The art of strategy involves the use of economics, politics and psychology as well as military means to advance goals and gain advantage. (See STRATEGIC STUDIES, STRATEGIC MANAGEMENT) (MP)

**STRATOSPHERE :** The region of the atmosphere above the troposphere that extends upwards between approximately 10 and 50 km altitude. This zone contains very little water. (See OZONE; OZONE HOLE; TROPOSPHERE). (RW+IP)

**STRATOSPHERIC OZONE LAYER :** See OZONE HOLE.

**STOLEN GENERATION:** Many Australian Aboriginal children were forcefully taken from their mothers, placed in institutions or adopted out to white families in former Australian history. These people and their descendents were not only stolen from their rightful families, but also had their language, cultural practices and ancestry stolen from them. In the absence of proper ancestral knowledge, many members of the stolen generation now choose to be adopted into some or other tribal group such as the Bunjalung Clan of northern NSW. (See AUSTRALIAN ABORIGINAL, RECONCILIATION) (MP & IP)

**STOPES, MARIE CARMICHAEL:** (1880-1958) a British scientist who proclaimed women's right to personal fulfillment and sexual satisfactphragm or *Stopes cap* for contraception. Her books, *Married Love* and *Wise Parenthood*, were widely read as they contributed greatly to the sexual liberation of women (see SANGER, MARGARET). (IP)

**STRAIN:** A pure culture of organisms within a species, characterized by one or more particular physical or genetic properties.

**STRESS:** A disturbing physiological or psychological influence which produces a state of severe tension and elicits a variety of endocrine responses meant to aid the animal to best withstand the stress. It is one of the most characteristic features of the stress response that its various defensive mechanisms are generally based on combinations of three types of responses, namely attack (fight), retreat (flight) and passive tolerance. Survival depends largely upon a correct blending of attack, retreat and standing one's ground. Stress is essentially reflected in the total rate of all the wear and tear caused by life and, although affects to a minimum. For example, many common diseases of adaptation like hypertension, gastric and duodenal ulcers can be avoided or ameliorated if the adaptive response to stress were better controlled. From the evolutionary perspective may have initially served to control population density but, in the course of time, acquired the ability to respond (see GENERAL ADAPTATION SYNDROME; SURVIVAL MECHANISMS, DISTRESS; EUSTRESS). (IP)

**STRONG SUSTAINABILITY:** "Strong" (or "narrow") sustainability requires the passing on to the next generation of equivalent human and natural capital to that of today, but unlike "weak" sustainability it requires them intact in similar forms and proportions. By not condoning substitution between natural and human assets, overall natural capital and critical ecosystem services are conserved. Strong sustainability is a superior basis for sustainable development because it recognizes the precautionary principle, ecological uncertainty and the risks of irreversible damage to critical ecosystem life-support services. Natural and human capital are complementary, and the relentless conversion of one into the other is ultimately unsustainable. (See WEAK SUSTAINABILITY, SUSTAINABILITY, CONSTANT CAPITAL) (MP)

**STS:** 1. Science, Technology and Society education methodology. (DM). 2. **Sequence Tagged Sites.** Reference sequences derived from different library clones, for which PCR assays have been designed. These unique sequences are useful in mapping analyses, where they define a specific reference point, in order to test a region for the presence of a particular locus. (GK)

**SUB-MACHINE GUN :** See AUTOMATIC WEAPONS.

**SUBMARINE :** A self-contained and propelled underwater habitat originally developed as a weapon of stealth. Submarines make possible the covert launch of conventional or nuclear inter-continental missiles, or the release of medium and short range missiles on the doorstep of the enemy. Manned or remote-controlled submarines and submersibles also have applications in science and exploration. (See NUCLEAR SUBMARINE, AQUABOT) (MP)

**SUBMARINE WARNING SYSTEM:** See LOW FREQUENCY ACTIVE SONAR

**SUBSISTENCE AGRICULTURE:** Small-scale agriculture such as indigenous or backyard farms which directly provide food for members of the local community. Subsistence agriculture may lack support if not recognized by economic indicators. (See SUBSISTENCE) (MP)

**SUBSISTENCE FISHING:** Fishing which makes a significant contribution towards the diet of communities, often indigenous or minority groups. (See SUBSISTENCE) (MP)

**SUBSPECIES:** The subdivision of a species, in which subpopulations have been reproductively isolated from one another long enough to differ genetically, forming distinct races of the same species. (See SPECIES, SUBPOPULATION, FOUNDER EFFECT) (MP)

**SUBSISTENCE:** The minimum supports or provisions for life and the means necessary to allow living, for example the provision of fresh water, nutrition and shelter. It is a global tragedy that many peoples and other organisms are denied access to the basic necessities of life. (See SUBSISTENCE AGRICULTURE, SUFFICIENCY) (MP)

**SUBJECTIVITY:** See OBJECTIVITY.

**SUBSTANCE ABUSE :** See DRUG ABUSE.

**SUBPOPULATION:** Geographically distinct groups within the population of a species, between which there is little or no migration or reproductive exchange. (See POPULATION, SUBSPECIES) (MP)

**SUDDEN INFANT DEATH SYNDROME (SIDS):** is defined as "*the sudden death of any infant or young child which is unexplained by history and in which thorough postmortem examination fails to demonstrate an adequate cause for death .*" Typically, however, infants at risk of SIDS may carry functional aberrations not readily identifiable by physical examination. While the etiology of SIDS remains a matter of speculation, a number of related epidemiological risk factors have been identified. Two identifiable risk groups are infants with intrauterine growth retardation (IUGR) and those from drug-abusing mothers. It is well established that infants born to drug-abusing mothers risk immaturity due to IUGR or preterm birth and suffer a 5-10 times increased incidence of SIDS. Strong postnatal breathing activity in the neonate is closely related to the degree of functional maturation of the brain's neuronal mechanisms regulating the respiratory system. A term inadequate, the immaturity of the infant's respiratory system may result in rOKING). (IP)

**SUFFERING:** An entity can be said to suffer if it is aware that it is in PAIN (q.v.). The extent to which non-humans (and even babies before they are born or reach a few months of post-birth age) can suffer is deeply contentious. Most biologists and philosophers who have considered the question hold that adult mammals, probably other vertebrates and even possibly some invertebrates such as octopuses can suffer. (See CONSCIOUSNESS) (MR)

**SUFI :** (from the Arabic "suuf", meaning "wool") Muslim mystic. The Sufis practice limitation in food and drink, and weigh words very carefully, thus limiting the extent of speech as well. In addition, they practice a style of meditation. Traditionally their garments were of coarse wool, and this is the origin of the term "Sufi". These practices are in order to help the mystic focus on God, and not be distracted by one's surroundings. (AG)

**SUFFICIENCY:** A condition of enough to provide for survival and comfort but without undue excess. (See DECONSUMERISM, DEMATERIALIZATION) (MP)

**SUN TZU:** Author of the definitive text on the traditional Chinese art of war ( *bing fa*) . Sun Tzu's '*The Art of War*' was first published around the 4th Century BCE, and an interpretation can be found in *Sun Tzu: The Art of War* by General Tao Hanzhang. One of the central principles is that "...to win one hundred victories in one hundred battles is not the acme of skill. To subdue the enemy without fighting is the supreme excellence." Today Sun Tzu's text is more commonly studied in the context of international business strategy than in the original context. (MP)

**SURROGATE:** Someone serving as a substitute decision maker. (See SURROGATE MOTHER & SURROGACY) (IP)

**SURROGATE MOTHER:** A woman who is artificially inseminated, with sperm or embryo, and carries an embryo to term, with the intention of relinquishing the child at birth. (DM)

**SURVIVAL:** Survival is the basic motivating force of all biological organisms, as Darwinian 'survival of the fittest' implies. The concept also helps explain motivational force of attack, retreat and standing one's ground. Modern industrial warfare coming recognized as a great and immediate concern. (See NATURAL SELECTION, EXTINCTION, HUMAN EXTINCTION) (MP)

**SURVIVAL CURVE:** A plot obtained by graphing the percentage of organisms surviving at different intervals against radiation dose. (IP)

**SURVIVAL OF THE FITTEST:** A popular descriptive term for evolution by the process of natural selection. (See SURVIVAL, NATURAL SELECTION) (MP)

**SUSCEPTIBILITY TESTING** Which provides information about the genetic component in a multi-factorial disorder. (JA)

**SUSTAIN:** (Old French: *sustenir* from Latin: *sustinēre* 'to hold up') To support. Also used as in to bear or 'sustain' a loss or injury, or to indicate corroboration/support for the validity of a judgement. (See SUSTAINABILITY, SUSTAINABLE DEVELOPMENT, SUBSISTENCE, SUSTENANCE) (MP)

**SUSTAINABILITY:** 1. Ability to be sustained, as of an ecosystem process, population etc. 2. A measure of policy accordance with principles and philosophies of sustainable development. 3. A goal or ultimate objective; a hypothetical place where requirements are met for sustaining ecosystems and human wellbeing. (See SUSTAIN, SUSTAINABLE, STRONG SUSTAINABILITY, WEAK SUSTAINABILITY, SUSTAINABLE DEVELOPMENT, CARRYING CAPACITY, UTOPIA) (MP)

**SUSTAINABLE:** Capable of being sustained, supported or maintained indefinitely. The capacity of a resource to replace, replenish or provide for itself, especially natural resources. If sustainability of a natural resource is hindered it becomes a receding resource or declining ecosystem service. The label 'sustainable' is often overused, for example in reference to 'sustainable' economic growth. The use of 'sustainable' raises questions. (See SUSTAINABILITY, SUSTAINABLE DEVELOPMENT, RENEWABLE ENERGY, RENEWABLE RESOURCES, LIMITS TO GROWTH) (MP)

**SUSTAINABLE AGRICULTURE:** Agriculture able to maintain primary production capacity without degrading or depleting soil productivity, land fertility, adjacent ecosystems or downstream water quality. Sustainable agricultural practices may include polyculture, permaculture, agroforestry, organic farming, trickle irrigation, subsistence farming etc. Wherever possible sustainable agriculture limits land clearing, monocultures, fertilizers, pesticides, herbicides, introduced species, and wasteful practices like flood irrigation. Some say that genetically modified organisms and crops may pose an ecological or health risk and are therefore unsustainable. Agrotechnology is often used however to sustain uninterrupted human food supply and prevent food crises, famine or malnutrition. (See PERMACULTURE, POLYCULTURE, AGROFORESTRY, AGROTECHNOLOGY, ORGANIC FARMING, SUBSISTENCE AGRICULTURE) (MP)

**SUSTAINABLE CORPORATION:** Businesses and organizations whose policies, practices and products serve to sustain and enhance the workplace, society and the biosphere. Sustainable corporate management goes beyond the language and thought of economics, focusing on broader sustainable development goals and "triple bottom line" accounting (social, ecological and economic outcomes). Example sets of

guiding principles for sustainable corporations include the UN Global Compact and the Coalition for Environmentally Responsible Economies (CERES). The ecologically sustainable corporation exercises precaution not to alter the limiting factors which allow surrounding organizations and ecosystems to function. Investment in a sustainable future also maintains profitability, for example savings from efficient energy/resource use, redevelopment of waste by-products into new markets, and new niche opportunities for sustainable products and services. Characteristics of natural ecosystems such as circulation of waste, process-orientation and cooperative network organization can be usefully emulated by corporate management. Old-style business, which ignores community concerns and treats workers and the environment as resources to be exploited, will eventually suffer the consequences of oppressive bureaucracy, employee alienation, public cynicism, environmental activism, and industrial relations conflict. New organizational architectures can instead increase corporate effectiveness and longevity by enhancing workplace satisfaction, innovation, autonomy and teamwork motivated by clearly defined and heartfelt company principles. (See VISIONARY COMPANY, SUSTAINABLE MANAGEMENT, SUSTAINABLE DEVELOPMENT PRINCIPLES, GLOBAL COMPACT, NATURAL STEP, TRIPLE BOTTOM LINE) (MP)

**SUSTAINABLE DEVELOPMENT:** First use of the term was in the I.U.C.N. ‘*World Conservation Strategy*’ (1980), influenced by works such as ‘*The Limits to Growth*’ (1972). The first widely recognized definition wasn’t until W.C.E.D. (World Commission on Environment and Development) ‘*Our Common Future*’ (1987; also known as ‘*The Brundtland Report*’) as follows:

*“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”*

This original aspect has been encapsulated in the term ‘Inter-generational Equity’ (more colloquially, “What about the kids?”). People have been expanding and redefining the principles of sustainable development ever since. The subject of *Intra-* generational or social equity naturally arises, and is usually included as a principle by environmentalists but not necessarily by capitalist governments. This highlighted other discrepancies of opinion about the meaning of sustainable development, with various commentators declaring it ambiguously fuzzy and self-contradictory in papers like ‘*Environmental Sustainability - Magic, Science and Religion in Natural Resource Management*’ (Ludwig 1993) and ‘*Sustainable Development - Modern Elixir or Sack Dress*’ (Frazier 1997). The flexibility of its interpretation and enticement to both sides of the spectrum - the promise of economic development *and* environmental sustainability - nevertheless aided the term’s survival and popularity. The basic evolution of the philosophy, politics and economics of sustainable development can be traced through the following major international forums: IUCN/UNDP/WWF ‘*Caring for the Earth*’ (1991); UNCED ‘*Rio Earth Summit*’ and ‘*Agenda 21*’ (1992); United Nations ‘*Commission on Sustainable Development*’ (1992); IUCN/IIED ‘*Strategies for National Sustainable Development*’ (1994); ‘*Conference on Population and Development*’ (1994); ‘*Conference on Social Development*’ (1995); ‘*Kyoto Conference on Climate Change*’ (1997); revised ‘*Earth Charter*’ (2000); and the ‘*Johannesburg World Summit on Sustainable Development*’ (2002). The landmark 1992 *Rio Earth Summit* aimed for a statement of principles (the ‘*Earth Charter*’), an action plan into the twenty-first century (‘*Agenda 21*’) and conventions on climate, biodiversity and forests. Climate and biodiversity conventions have typically been weakened by US protectionism of its energy and biotechnology industries, and the forests issue was hampered by South claiming that North was using protection of tropical forests as a carbon sink for its greenhouse emissions. Final statements and conventions were accused of being a dilute and deliberately

ambiguous compromise, and the *Earth Charter* wasn't fictional institutions. Other official initiatives have been taken at multi-national and national levels, for example Commission of the European Community '*Towards Sustainability*' (1993) and Commonwealth of Australia '*National Strategy for Ecologically Sustainable Development*' (1992). Australia chose the term 'Ecologically Sustainable Development' to emphasize ecosystems over broader economic and social aspects. 'Environmentally Sustainable Development' provides another slant on the term which de-emphasizes both economy and ecology. An investigation of UK sustainability '*Blueprint for a Green Economy*' (David Pearce *et al*, 1989) expanded the philosophy and resulted in '*Blueprint 2: Greening the World Economy*' (1991) and '*Blueprint 3: Measuring Sustainable Development*' (1993). Measurement of sustainability indicators and models is inherently difficult. For example, aspects of human wellbeing include things like poverty, quality of life, modernization, health, democracy, freedom and fair trade, also the subject matter of sustainable development. Sustainability indicators include those measured by the '*Genuine Progress Indicator*', '*Human Development Index*', '*Index of Social Health*' and '*State of the Environment Reports*'. To ensure all-inclusivity, the '*Chair of Sustainable Development*' (di Castri 1995) metaphor was introduced (a Renaissance chair bringing to mind integrated Enlightenment thinking), with four essential legs - the economic, ecological, social and cultural. Other models have coalesced socio-cultural, or conversely added physico-chemical, political, legal, informational or other domains of the environment. The application of sustainable development requires integrated, strategic, adaptive and precautionary management. To many people today, the concept of Sustainable Development has become more than just a slogan or cliché, but a guiding symbol and pathway to a wonderful utopian place called 'Sustainability'. It is certain SUSTAINABLE MANAGEMENT, SUSTAINABLE DEVELOPMENT PRINCIPLES, INTERGENERATIONAL EQUITY, INTRAGENERATIONAL EQUITY, AGENDA 21, PROGRESS, DEVELOPMENT, UTOPIA) (MP)

**SUSTAINABLE DEVELOPMENT PRINCIPLES:** There is a diversity of views on the most appropriate set of principles for the balanced management of "Sustainable Development". A summary of some of the main objectives and principles follows. Sustainable development enhances current community "wellbeing" and safeguards the "welfare" of future generations. Most central to the concept is the principle of "inter-generational equity", which may be achieved by the "constant capital" rule. A "strong" version of this requirement is that of "constant natural capital" (i.e. not allowing the substitution of natural capital for built or human capital). "Critical natural capital" must never be substituted because it is essential to the functioning of ecosystem life-support services. This leads to the principles of "maintaining biological diversity" (i.e. loss of species/genetic diversity is a justifiable reason to restrain development) and "maintaining essential ecological processes". The term "ecologically sustainable development" emphasizes these objectives. Ecosystem and habitat levels are the appropriate scales to address the biodiversity issue (in addition to the species level). The "precautionary principle" must be implemented to deal cautiously with any risks of irreversible environmental damage. Recognition must be made of "the global dimension", since many sustainability issues such as global warming and biodiversity are international in scope. "Integrated", "strategic" and "adaptive" management techniques are essential here. "Limits to growth" means that development must not exceed the carrying capacity of the environment to support it (or the carrying capacity of the globe to support us). "Limits of acceptable change" imply something similar with emphasis on human preferences. "Sustainable resource use" means that renewable resources are not used at a rate faster than they can replenish themselves, that non-renewable use generates development of replacement technologies, and that wastes are not produced faster than they can be assimilated by the environment. This requires "efficiency" and "effectiveness" in resource use, and mutually supportive international trade and environmental policies (including



debt reduction and poverty relief only resilient economies can have good capacity for environmental protection). "Environmental valuation", or the internalization of environmental costs, implies that prices for goods and services should reflect the social and ecological costs of their production and consumption. The "integration of economic and environmental goals" helps minimize any previous incompatibility. The field of "ecological economics" helps address these issues. The above objectives and principles must be carried out with "full community participation" and "respect for human rights". Environment groups often disagree with governments in their interpretation of sustainable development environmentalists emphasizing the "sustainable" half of the term (fragility/irreversibility), and the official line emphasizing "development" (economic flexibility). Various further principles included by the former are "intra-generational equity" (fairness in wealth distribution), "qualitative development" (socio-cultural/ethical values primary to economic ones), "sustainable income" (only income able to be maintained indefinitely should be taken), and concepts of "sufficiency", "non-consumerism", "cultural diversity", "ecocentrism" and "ethics". (See SUSTAINABLE DEVELOPMENT, SUSTAINABLE MANAGEMENT, WELLBEING, PRECAUTIONARY PRINCIPLE, INTERGENERATIONAL EQUITY, INTRAGENERATIONAL EQUITY, LIMITS TO GROWTH, CRITICAL NATURAL CAPITAL, BIODIVERSITY, EFFICIENCY, CONSUMPTION, HUMAN RIGHTS, ENVIRONMENTAL VALUATION) (MP)

**SUSTAINABLE ENERGY DEVELOPMENT AUTHORITY - AUSTRALIA** is an agency created in 1996 by the New South Wales government to reduce the level of greenhouse gas emissions in this state. SEDA accomplishes this by promoting investment in the commercialization and use of sustainable energy technologies (see GREENHOUSE EFFECT & SUSTAINABLE DEVELOPMENT). (IP)

**SUSTAINABLE FISHING:** (See FISHING PRACTICES, SUSTAINABLE DEVELOPMENT)

**SUSTAINABLE FORESTRY:** (See REAFFORESTATION, SUSTAINABLE DEVELOPMENT)

**SUSTAINABLE MANAGEMENT:** Sustainable management is handling, direction and control of an organization or environment according to sustainable development goals and principles. Well-defined core principles of social responsibility and environmental stewardship form the central management framework. This involves integrated, precautionary, strategic and adaptive management practices, and includes full consideration of ecological, social and cultural as well as economic factors. Sustainable management of natural resources requires ongoing maintenance, renewal or replacement of all natural capital. There should be acknowledgment of the ecocentric nature of the system under management and continuous monitoring of ecosystem indicators. Sustainable sociopolitical management sustains and enhances intra- and intergenerational human wellbeing. Sustainable organizations manage human resources in a way which promotes employee satisfaction, human rights, cultural diversity and innovative potential in the workplace. (See SUSTAINABLE CORPORATION, INTEGRATED MANAGEMENT, STRATEGIC MANAGEMENT, ADAPTIVE MANAGEMENT, PRECAUTIONARY PRINCIPLE, NATURAL STEP, TRIPLE BOTTOM LINE, SUSTAINABLE DEVELOPMENT PRINCIPLES) (MP)

**SUSTAINABLE TECHNOLOGIES:** Scientific progress and economic development usually involve the implementation of new technologies. Sustainable technologies do not degrade or deplete elements of natural ecosystems or human wellbeing. Typically defense industries have been a driver of *non-* sustainable technologies. Transition to a sustainable world may involve a shift in their use from warfare to peacekeeping, emergency response and dangerous humanitarian missions. The re-allocation of technologies from defense to civilian applications can be economically successful, as with Japanese electronic, mechanical and optical products after 1945. Sustainable technologies may be in the health, environmental science, media, information, management, energy or service sectors, and include any technology which

enhances quality of human or ecological life. Sustainable industries and destructive industries can obviously both generate jobs and income. Why not be part of the next wave of sustainable corporations - their vision and the nature of their technology will make the crucial difference. A critical mass should be reached where socio-economically and environmentally sustainable technologies will become the norm. (See TECHNOLOGY, ENGINEERING ETHICS, SUSTAINABLE CORPORATION, VISIONARY COMPANY, TECHNOLOGICAL DETERMINISM, CRITICAL MASS) (MP)

**SUSTAINABLE YIELD:** The level at which a resource may be harvested or depleted such that it is able to replenish and sustain itself indefinitely, for example the catch of a fishery, timber yield in forestry, or agricultural productivity. The sustainable yield is an uncertain threshold level at which a population or resource will not be at risk of overall or long-term decline. (See YIELD, OPTIMUM SUSTAINABLE YIELD, THRESHOLD MANAGEMENT) (MP)

**SUSTENANCE:** The food, daily rations, nutrition taken in to sustain health and bodily functions. (MP)

**SUU KYI, AUNG SAN :** (1945- ). Burmese political leader and resolute opponent of Burma's military government since the late 1980s. Despite winning the elections the ruling military junta has refused to relinquish power and kept Suu Kyi under house arrest, where for extended periods she was forbidden to communicate with her husband and her two sons. Suu Kyi is the daughter of the Burmese leader of the independence movement General Aung San who was assassinated in 1947. In 1988 Aung San Suu Kyi founded the National League of Democracy and subsequently became the most articulate leader of the opposition to the military government. In recognition for her efforts to restore free elections in Burma, Suu Kyi in 1990 won the Sakharov Prize and in 1991 both the European Parliament Human Rights Prizes and the Nobel Peace Prize. Her books include '*Freedom from Fear*' among many other writings. Suu Kyi is opposed to violence and emphasizes the need for dialogue, patience and persistence. (IP)

**SWARM INTELLIGENCE:** Media terminology for integrated wireless communication and artificial neural networking of 'smart dust' microprocessors or likely future robot, mote or nanobot networks. (See SMART DUST, MOTE, NANOBOT, SENSOR ARRAYS, ARTIFICIAL NEURAL NETWORK) (MP)

**SWASTIKA:** 1. counterclockwise- Ancient symbol of good luck. This symbol is found in inscriptions and on monuments of several different cultures. In India this symbol has special connection with the Hindu and Buddhist traditions. In several countries in East Asia it serves as the symbol of Buddhism, 2. clockwise- symbol adopted by the National Socialist (Nazi) party in Germany as the official symbol of the party.(AG)

**SWINGING:** Extra-marital sex in which consenting couples temporarily exchange partners with one another. Previously termed "wife-swapping", this became "swinging" to remove the sexist connotation that men are the only eager instigators. Closed swinging is when the pairs have intercourse in private, but open swinging, or a foursome, lessens the anxiety and jealousy of not knowing and allows the emergence of repressed bisexuality. Research has shown that 75% of such cases include lesbian activities, but male homosexual sex is rare. Swinging can of course be emotionally dangerous, and is best if it happens in a relaxed, natural way between non-jealous committed partners interested in outside experience without the conventional and emotionally immature Western solution of adultery. (See OPEN MARRIAGE, ORGY) (MP)

**SYMBIOSIS:** "Living together" (from the Greek: *sym* "together" and *bios* "life"). In ecology the term is commonly used to describe

cooperation between two or more species in which there is mutual benefit from the association. Sometimes the term is used more broadly and broken up into mutualism, commensalism and parasitism. Examples of mutual symbioses include the interaction between zooxanthellae and cnidarians to form coral reefs, or between plants and their pollinators. Symbiotic organisms may be more vulnerable to disturbance because the preconditions for both species must be preserved. (See COMMENSALISM, MUTUALISM, PARASITE) (MP)

**SYMPATHY:** (Greek: *sympatheia* "together in suffering") A feeling of awareness and pity for another person's distress or sorrow, perhaps with sharing of the other's emotions. Sympathy the mutual interaction of paired organs. Sympathy for another person allows the more objective emotional insights of empathy and leads to compassionate behaviour. (See EMPATHY, COMPASSION). (MP)

**symPATry:** (Greek: *sym* 'together' and Latin: *patria* 'homeland'). Occupying the same geographic distribution or range. (Compare Allopatry ) (MP)

**SYMPTOM:** (Greek: *sumpiptein* 'to occur') In medch is a )

**SYNAPSE :** The synapse is the junction between two nerve cells (neurons). Communication is achieved across the synapse by converting electrical nervous impulses into neurotransmitter chemicals which travel from the axon to the dendrites of neighboring neurons. In a neuromuscular synapse, transmitter substances such as acetylcholine cross the synaptic cleft between the motor neuron and the muscle to be stimulated. (See NEURON, BRAIN NEUROTRANSMITTERS, DENDRITES, AXON) (MP)

**SYNDROME:** The combination of signs and symptoms which occur together in any particular disorder. A family of diseases E.g. Down syndrome, AIDS. (JA)

**SYNESTHESIA:** (Greek: *syn* 'together' + *aisthetikos* 'capacity for perception/sensitivity') A phenomenon in which sensations of two or more modalities accompany one another; for example a visual sensation is experienced when a particular sound is heard, or a smell is experienced on seeing images on a TV screen, or the different letters of the alphabet are seen in differing but specific personal colors. The phenomenon is also termed secondary sensation and can be dramatically induced in some drug states, presumably through the loss of the normal inhibitory mechanisms which isolate the central processing of the senses (Greek *syn* together + *aisthetikos* capacity for perception/sensitivity). (IP+MP)

**SYNAPSE:** See NEURON.

**SYNERGISM:** The combined effects of two substances/pollutants/chemicals are greater than the sum total of their individual effect. Or the ability of two organisms to bring about changes (usually chemical) that neither can accomplish alone. (JA) (IP) (See CUMULATIVE EFFECTS)

**SYNGAMY:** The mingling of the male and female haploid chromosome sets following the breakdown of the pronuclear membranes. This results in the formation of the zygote. (DM)

**SYNROC:** (Synthetic + Rock) An artificial ceramic substance which can incorporate nuclear waste. (MP)

**SYNTHETIC:** See ARTIFICIAL.

**SYNTHETIC HORMONE DISRUPTORS** are man-made environmental toxicants implicated in reducing male fertility in humans and wildlife and in causing several types of human cancer, most controversially breast cancer. In the book *Our Stolen Future*, authors Colborn, Dumanoski and Myers assembled significant evidence, accumulated over many years, which implicate a wide range of industrial chemicals; such as the widely used alkyl ethoxylate detergents, brominated flame retardants, polychlorinated pesticides, biphenolic chemicals in epoxy resins, polycarbonated plastics and anti-fouling agents and synthetic steroids used in the female contraceptive pill, in highly disturbing environmental phenomena. Not since 1962, when Rachel Carson in *Silent Spring* highlighted the reproductive toxicity of DDT, has there been such public and scientific concern about the health risks posed by a single group of environmental toxicants (see POLYCHLORINATED BIPHENYLS & DDT). (IP)

**SYPHILIS** : A sexually transmitted disease caused by the spirochete *Treponema pallidum*. There are three clearly marked stages of the disease. After an incubation period of several weeks, the primary sore (chancre) appears at the site of infection; for example, the vulva, vagina, perineum, penis and round the mouth. After several weeks the chancre subsides spontaneously. Secondary lesions, consisting of skin rashes and raised papules (condylomata lata) on the external genitalia and vaginal walls, appear 3-4 months after infection. The rashes subside after several months and are followed by a latent period of a variable number of years after which tertiary lesions (gumma) develop in the nervous system and many organs - sometimes causing a generalized paralysis. Sexual transmission occurs during the primary and secondary stages when the infectious discharge, containing living spirochetes, is transferred. Congenital transmission occurs when microbes from an infected mother cross the placenta to the fetus. Accidental spread of infection may also occur during childbirth or by blood transfusion. Syphilis, like AIDS, spreads most rapidly among the poor and mostly in developing countries. Syphilis and AIDS are very different diseases medically, but if they are juxtaposed then their similarities, especially in relation to their initial incurability, popular reactions provoked and the sense of emergency generated, become evident. (See AIDS). (IP)

**SYSTEM:** An organized unit with many components, a functional unit with an input and an output, at least two components are needed to create a system, components are independent and interdependent at the same time, components regularly interact to make an output, e.g. a watch, output = shows time, ecosystem's output is ecobalance, see ecobalance- has many subdivisions- simple, complex, open, closed, mature and youthful. H.T Odum defines "A system is a group of parts that are interacting according to some kind of process, and systems are often visualized as component blocks with some kind of connections drawn between them." There are several types we can include:

**Simple system:** has limited number of components with limited control systems e.g. A bottle and a screw cap.

**Complex system:** Has many components, intricately interconnected with many control systems. E.g, a spaceship.

**Open system:** indicates the free flow of matter and energy in and out of a system e.g. a pond/agricultural field. It has one or more inflows and outflows, biosphere is an open system. solar energy comes in and infra red radiation goes out.

**Closed system:** A system totally cut off from the main system. restriction in the flow of matter and energy in a system. eg. Nearest example - a sterile algae culture flask with nutrients, except for the input of energy source, as there is no system in complete isolation, such systems are rare and temporary.

**Sub systems:** systems within systems, A cell is a system and organ is a system, these form biological system, one sub-serves the other. (JA)

**SYSTEMS ANALYSIS:** Systems analysis looks at the nature and requirements of a system (e.g. a task, organization or ecology) and the conceptual feasibility of potential new arrangements. Systems theory investigates the interdependent parts, their functions and relations. The

goal is systems engineering, design and construction of integrated systems (e.g. management models, software, hardware) using systems analysis in association with information technology. (See HIERARCHY THEORY, SYSTEM) (MP)

**SYSTEM DYNAMICS:** The factors changing in systems; the action of processes on systems. Components of systems affecting their dynamics include energy, mass and momentum (or their conceptual equivalents). Also pertinent are inputs, outputs, flows, feedback, rates of change, chemical reactions, mixing conditions etc. Behaviors and changes in the larger scale systems are often dependent on those of the smaller scale systems, but may also have unpredictable emergent properties. (See PROCESS, NETWORK DYNAMICS, SYSTEMS THEORY, FEEDBACK, EMERGENT PROPERTIES, ENVIRONMENTAL PROCESS, PRESSURE/ STATE/ RESPONSE MODEL) (MP)

**SYSTEMS THEORY:** 'Systems theory' deals with thcs (energy/momentum) and organization (subsystems). Systems are composed and organized in 'nested' hierarchies of 'subsystems'. These associational relationships lead to coordinated behavior in subsystems and 'emergent properties' of meta-systems. Awareness of this hierarchy of systems nested within systems is important; clusters of activity differently organized but correlated somewhat with the concept of 'scale'. Primary categorizations of systems are by spatial (and temporal) scale, from micro-scale (molecules, cells) through macro- (ecosystems, cities) to mega-scale (global environment). 'Complexity theory' studies information, patterns and predictability and 'emergent properties' of systems. 'Network geometry' describes the network-type of system. 'Systems analysis', system dynamics' and 'fuzzy logic' are other models. (See SYSTEM, ENVIRONMENTAL SYSTEMS, SYSTEMS ANALYSIS, SYSTEM DYNAMICS, COMPLEXITY THEORY, FUZZY LOGIC, SUBSYSTEM, NETWORK, SCALE) (MP)

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<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**TACTICS:** Tactics are localized techniques or stratagems, the immediate means to desired or strategic ends. Strategy is the larger-scale framework of direction and control. Military tactics include specific offensives or maneuvers in the presence of battle. The ethics (*jus ad bellum*) of tactics, the blunt end of war and peacekeeping, are matters of great concern. (See STRATEGY, JUDGE ADVOCATE GENERAL, JUS AD BELLUM) (MP)

**TAIGA:** Northern hemisphere (Eurasia, North America) cold-temperate coniferous forest environment, habitat and ecological communities (evergreen conifers, pine, spruce, fir trees, mink, elk, wolf etc.) (See CONIFEROUS FOREST, TUNDRA) (MP)

**TALMUD:** The Talmud is a Jewish holy book, next in authority after the MISHNA (q.v.) The Talmud actually contains the Mishna, together with detailed commentaries on the Mishna, which are called the *Gemarra* . Just as the Mishna consists of Rabbinical attempts to explain what is unclear in the Bible, the Gemarra consists of later Rabbinical attempts to explain what is unclear in the Mishna. The Mishna is written in Hebrew. But most of the Gemarra was written in Babylon, after the Babylonians conquered the Land of Israel and forcefully exiled the Israeli people to various parts of the world. The Gemarra was written, therefore, in Aramaic, a language similar to Hebrew, which was the international language of much of the Middle East in those days. (FL)

**TANAKH:** The Jewish Scripture. The word Tanakh is an acronym (Torah+Nevi'im+Ketubim, i.e. Torah+Prophets+Writings). The concept of Tanakh differs from that of "Old Testament" in the Christian Bible, although two texts may appear quite similar. The traditional Jewish order of the text is based upon a tripartite division in which the category of "Writings" is a miscellaneous category including Psalms, some historical books (such as Chronicles), and some books of wisdom literature (such as Ecclesiastes). The books of the Apocrypha are not included in the Tanakh. In addition, the authoritative language of the Tanakh is Hebrew. Translations into other languages are secondary. Finally, whereas the term "Old Testament" presupposes a New Testament, the Tanakh is self-contained from the Jewish perspective, and later books can at most serve as commentary to it. (AG)

**TAO TE CHING:** (Chinese: Classic of *Tao* "the Way" and *Te* "virtue") Philosophical Chinese text of Taoism, unsubstantiated authorship usually ascribed to Lao-Tse (alternate spellings Lao-zi or Lao Tzu), 6th Century BCE, possibly a composite of earlier philosophy from the 4th Century BCE. The Tao Te Ching promotes effortless harmony and spontaneity in accordance with the natural flows of the cosmos. The ornate style of the text leaves it open to varying interpretations. Taoism stands in general opposition to the ritual structure and moral discipline of Confucianism. (See TAOISM, LAO-TSE, CHUANG TZU) (MP)

**TASTE :** (Middle English *tasten* 'to taste'). The sense of perceiving different flavors in soluble substances. Taste buds are found in the papillae of the tongue, soft palate, pharynx and epiglottis and consist of small bundles of cells and nerve endings of the glossopharyngeal, facial and vagus nerves (cranial nerves VII, IX & X). Chemical substances in solution that enter the taste buds stimulate the nerve cells which transmit impulses to the thalamus of the brain and then to the taste area in the cerebral cortex where taste is perceived. There are four fundamental sensations of taste - sweet, sour, bitter and salt; however, this is probably an oversimplification because perception varies widely and many 'tastes' cannot be easily classified. (See SENSES). (IP)

**TAXIS** the ability of a wide variety of microorganisms, simple animals and plants to respond to light, magnetic fields and chemical substances in the surrounding environment (see CHEMOTAXIS). (IP)

**TAY-SACH'S DISEASE** a single gene disorder which destroys the insulating sheath around nerves and leads to death in infancy - is particularly common among Ashkenazi Jews as a consequence of the founder effect. (DM+DR)

**T-DNA :** transferred DNA . E.g. in the bacterium *Agrobacterium tumefaciens* a portion of its plasmid DNA is transferred on to a plant inducing the formation of a gall structure, a tumor like hard structure. (JA)

**TEAMWORK:** The coming together of an alliance or group of minds to collaborate, co-operatively work on a project, solve problems, negotiate, resolve conflict etc. Teamwork may involve a business or research team, a friendship group or marriage, may use techniques like

brainstorming, group decision-support or the Delphi method, and may result in compromise or consensus. Whereas competition results in duplicated effort and lost efficiency, collaboration and cooperation ensure a certain balance and multiply the scale of possibilities. (See COLLABORATION, COLLECTIVE, COOPERATION, BRAINSTORMING, DELPHI METHOD, NEGOTIATION, MEDIATION, CONSENSUS, COMPROMISE, UNITY, MATESHIP, MARRIAGE) (MP)

**TECHNOCRACY** : Combining technology and democracy, the term technocracy was coined by William Henry Smyth to refer to democratic progress served by scientists and technicians. More recently its meaning has reversed and strengthened into a socio-political system controlled by 'rational' scientific, engineering and technological experts rather than true democratic principles. (See TECHNOCRAT, TECHNOLOGICAL DETERMINISM) (MP)

**TECHNOCENTRIC** : A condition of social orientation around technology; the philosophical viewpoint giving central importance to human technology (including economic, industrial and urban living). Technocentrism is a reminder of the modern predicament of our created environment alienating us from nature and our origins. (See ANTHROPOCENTRIC, ECOCENTRIC, BIOCENTRIC) (MP)

**TECHNOCRAT** : One who believes in technological determinism and technocentric social organization, basing political opinions and decisions upon technological 'requirements' rather than human needs and humane values. (See TECHNOCRACY, TECHNOLOGICAL DETERMINISM) (MP)

**TECHNOLOGICAL DETERMINISM** : Term coined by Thorstein Veblen to describe deterministic faith in technological progress, in which socio-political decisions and development processes are controlled by technological capacity rather than philosophical or ethical value systems. Technological determinism may increase apathy and environmental risk-taking due to faith in the technological 'quick fix'. Social guidance and political restraint should determine the advancement of technology, rather than humans becoming controlled and ensnared by our own inventions. (See TECHNOCRACY, TECHNOCRAT, TECHNOCENTRIC) (MP)

**TECHNOLOGY**: The modern world makes it almost impossible to unlink scientific discovery from subsequent technological use of that information. Scientists cannot dodge ethical consideration of the implications and possible impacts of proposed research. Semi-permeable barriers to the development of technology include whether to do the science (research and development stage), whether to publish the information (academic journals and media editors), and the ethics of engineers (design, engineering and production stages). Defense, economics and scientific curiosity have typically been the drivers of technology. Technologies have beneficial or detrimental impacts on human and ecological wellbeing depending on how they are used. Many have been found too dangerous and had their production reduced, for example biochemical weapons, thalidomide, DDT, CFCs etc. But technology has a habit of only appearing in the public consciousness once already at the design or application stages. Genetic engineering is an example, despite potential for accidental damage to ecosystems and potential future misuse in the form of biological weapons. The first nuclear explosion was detonated despite fears that unknown upper limits to the chain reaction might ignite the atmosphere. Artificial life and nanotechnology may be the technologies of the future which pose the greatest threat to humankind, specifically due to their potential for replication in an unlimited chain reaction. If we had a desire to block the dangerous implications of these two technologies then molecular electronics may be one of the few remaining bottlenecks. It is generally difficult to prevent the emergence of new technologies - before they become unstoppable except by the laws of physics. In parts this is due to the

fragmented nature of international research, including corporate alliances, secret defense science, different national laws, and the widespread electronic accessibility of information. One argument goes that since the emergence of global-scale dangerous technologies are inevitable, benign powers must develop *some* aspects of them *first* to ensure appropriate global defenses. The other argument says that we must oppose them entirely with the use of new instruments of global law and professional codes of ethics. (See ACCELERATING PACE OF CHANGE, TECHNOLOGICAL DETERMINISM, ENGINEERING ETHICS, SUSTAINABLE TECHNOLOGIES, VISIONARY COMPANY, MOLECULAR ELECTRONICS, NANOTECHNOLOGY WEAPONS, ARTIFICIAL INTELLIGENCE, ROBOTICS) (MP)

**TECHNOLOGY ASSESSMENT** : The evaluation of a technology in terms of its efficacy and impact on society. (DM)

**TECHNOLOGY TRANSFER**: The process of converting scientific knowledge into useful products. (DM)

**TELAESTHESIA**: See TELESTHESIA .

**TELECOMMUTING**: Working at home with the use of an internet connection to the workplace. (See VIDEO CONFERENCING) (MP).

**TELECONFERENCING**: See VIDEO CONFERENCING.

**TELEOLOGICAL** : Teleo (God) purpose oriented creation by God, beingness of human beings in the image of God. E.g. Purpose of the heart is to pump blood as opposed to Darwinism where the work of the heart is to pump blood. Genetic engineering alters the telos or beingness of a being. (JA)

**TELEOLOGY**: A teleological explanation is explaining phenomena by their design, purpose, or final causes. A branch of moral philosophy dealing with cause and effect of an action, a belief that there are purposes and design in nature, consequently a belief in the existence of a Creator. Telos :end; the doctrine of ends, purpose or final causes e.g. The purpose of the heart is to pump blood to other parts of the body. Christians have used it to imply a design and purpose in creation by God, intrinsic value. (DM, JA)

**TELEPATHY**: (Greek: *tele* "far" + *patheia* "perception") The alleged ability to communicate thoughts and perceptions with another mind over a distance without the use of the sense organs. Traditionally scorned by scientific skeptics, a form of telepathy may conceivably be achieved through advances in cybernetics and wireless technology. Using implantable microchips grafted to the nervous system and a connection between two people with a wireless internet linkage, rudimentary telesthesia should be achievable, and potentially even the invisible bond of telepathic communication. Such research has been proposed and begun by the self-experimenting cybernetics pioneers Kevin and Irena Warwick. (See TELESTHESIA, CYBERNETICS, MICROCHIP IMPLANTS, PSYCHOKINESIS) (MP)

**TELEPORTATION**: The concept of *Star Trek's* transportation beam has been a science fiction staple for many years, but the principle has also been worked upon by serious science, for example in IBM laboratories. The structure of an object could theoretically be mapped at an atomic level and converted into a coded signal for transmission at light speed, to be resurrected at the other end rather like a three-dimensional fax machine. The future advent of quantum computing combined with nanotechnology may provide the necessary technology. There would remain serious ethical doubts about the teleportation of living organisms. Leaving aside potential DNA mutations caused by copying errors, there would be philosophical questions as to what constitutes a continuous life-experience. There is no guarantee that the person at the other end would not just be a clone with your memories. From the perspective of Captain Kirk or Spock entering a teleportation device, each transfer may in fact be the death of their subjective existence. Current technology is far from this dilemma, with work rather being done at the atomic or quantum levels. Such research is nevertheless uncovering interesting questions, such as the tunnel effect in which information has



been observed apparently moving faster than light. (MP)

**TELESTHESIA:** (Greek: *tele* "far" + *aisthesis* "sensation") Almost synonymous with telepathy, telesthesia is the ability to receive sensations or feelings from another person over a distance. This may be achievable through advances in cybernetics and wireless technology, with emotional states signaled between people via the internet. (See TELEPATHY) (MP)

**TELEVISION (TV):** TV is today so ubiquitous that it hardly needs defining to anyone in the world likely to be reading this. On the one hand it is a physical device which converts electrical impulses transmitted by radio waves or cable into audiovisual programs on a screen, first demonstrated by J. L. Baird in 1926 and broadcast into homes from the 1950s. On the other hand it is a massive medium of information distribution, a manipulator of emotions and a communications tool with immense potential for creating social change. The antenna skylines of most human settlements and the spread of popular icons such as the Simpsons are testament to the power of TV; perhaps more of this power could be today harnessed against human apathy and towards global awareness and ethical value systems. Control of the media is also control over human culture. The commercialization of TV has seen programming content reach new lows of pointless consumerism and violence, and the encroachment of entertainment into news and current affairs. The remote control also had a dramatic influence on viewing patterns, and by shortening attention spans has increased the tendency towards sensationalism and shallow treatment of subjects. Especially in the West, TV is a culturally sanctioned addiction. In addition to the costs of lost opportunity, prolonged watching may inhibit the development of active mental skills. Viewing requires minimal brain activity; a constant stream of input leaves little time for thinking or reflection. Unlike the internet, which involves motivation, or books which engage the imagination, TV is essentially a passive pursuit. The nature and content of television is changing, however. The transition to internet broadcasting and digital choice may increase viewer interactivity and the number of specialized channels, but may herald an end to the era of centralized direction and control of this means of mass education. (See VIOLENT MEDIA, PROPAGANDA, CULTURE JAMMING, INTERNET, SBS, TELEVISION ADDICTION, TELEVISION AS A TOOL FOR CHANGE) (MP)

**TELEVISION ADDICTION:** See TELEVISION AS A TOOL FOR CHANGE, INTERNET ADDICTION.

**TELEVISION AS A TOOL FOR CHANGE:** See TELEVISION, TELEVISION ADDICTION.

**TELOMERASE:** See TELOMERES, CLONING.

**TELOMERE:** See TELOMERASE, CLONING, LIFE EXTENSION.

**TEMPERATE RAINFOREST:** Moist closed-canopy evergreen forest in temperate climates. These mid-latitude rainforests usually have a simpler structure and composition than tropical rainforests, often with only a single canopy, a lower diversity of species, smaller-leaved slender trees, and ferns abundant but palms rare. Temperate rainforests may interface with subtropical, wet sclerophyll, broadleaf or evergreen mixed forests. In the Australian example most temperate rainforests are to be found in New South Wales, which also contains dry and subtropical rainforest types. They include cathedral-like cool temperate rainforests dominated by Antarctic Beech *Nothofagus moorei* or Pinkwood *Eucryphia moorei*, and warm temperate rainforests often dominated by Coachwood *Ceratopetalum apetalum* and Sassafras *Doryphora sassafras*. (See TROPICAL RAINFOREST) (MP)

**TEMPERATURE:** Temperature is a property of matter which measures the kinetic energy of particles resulting from the application of heat. All objects emit and absorb radiation, and are at a constant temperature when these are balanced. Temperature is measured by observing gas pressure or liquid expansion in a thermometer. The Celsius scale has the reference points of 0°C for freezing and 100°C for boiling point of water. The Fahrenheit scale has 32°F for freezing and 212°F for boiling. The Kelvin scale is widely used in science, beginning at absolute zero

(0K = -273°C) with the same change per degree as the Celsius scale (thus 0°C = 273K). (See HEATING, THERMODYNAMICS, FAHRENHEIT, CELSIUS DEGREE) (MP)

**TERATOGEN** any reproductive and /or developmental toxicant that induces structural malformations, metabolic or physiological dysfunction, or psychological/behavioral deficits in the offspring, either at birth or in any defined postnatal period (see TERATOLOGY & CONGENITAL MALFORMATION). (DM)

**TERATOGENIC:** Producing malformation in an embryo or fetus.

**TERATOLOGY** from the Greek word *teras* meaning *abnormal form*, is the branch of science that deals with the causes, mechanisms, manifestations and prevention of congenital defects. (DM)

**TERATOMA:** A new and uncontrolled growth of cells and tissues that are the product of an abnormal fertilization without any potential to develop into an embryo proper or fetus. (DM)

**TERMINAL SEDATION** : The phrase came into usage as early as 1980s. also known as the end-of-life care, a legal alternative to assisted suicide/slow euthanasia. It is also known as the “deliberate termination of awareness” If no other means of alleviating the pain exist then it is intended to simply relieve the pain effectively. (JA).

**TETRAPLOIDY:** Four complete sets of chromosomes per cell. Ten percent of spontaneous abortions show tri or tetraploidy of chromosomal aberrations, which are not viable. (See ABORTION). (GK)

**TERRA NULLIUS** in Latin "land belonging to no one" (see AUSTRALIAN ABORIGINAL & NATIVE TITLE LEGISLATION - AUSTRALIA). (IP)

**TESTOSTERONE** : A naturally occurring androgenic hormone often referred to as the male sex hormone. Testosterone is the principal androgen in the male, approximately 95% of it is produced by the Leydig cells in the testes with the remainder coming from the adrenal glands. In a normal adult male, the endocrine effects of testosterone are felt in virtually every tissue but in terms of its effect on fertility, the primary role of testosterone is in its regulation of spermatogenesis. Testosterone is also produced in the ovaries but in lower concentration. In the female androgens (testosterone and androstenedione) is likewise essential for fertility (oocyte maturation) and sexual behavior. (IP)

**THALES** (c. 585 BC) Is thought of as the first Greek philosopher. His doctrine that "everything is made of water" is important as a forerunner of many monistic doctrines, throughout the history of science, which have sought to explain everything in terms of a single, unitary explanation of the form: "Everything is X". Examples are: "Everything is physics", "Everything is chemistry", and of course: "Everything is genetics". We are gradually waking up to the fact that simplistic explanations are inadequate and that the causes of phenomena are too complex for unitary explanations. Thales also said that everything is full of gods, pointing to the spiritual side of scientific explanation. (FL)

**THAUMATIN** : Is a sweetening ingredient found in the fruits of the plant *Thaumatococcus danielli*. A pertinacious substance with a very high sweetening capacity then sugar (3000 times). The gene to produce Thaumatin has been genetically engineering into E. coli and other microorganisms so that it can be produced on a larger scale. (JA)

**THC** : The most important active constituent of hemp plants, THC (delta-9-tetrahydrocannabinol) is the drug component of *Cannabis* which creates the euphoric high sought by users of marijuana. Synthetic THC (dronabinol; trade names Deltanyne and Marinol) has been approved for use as an analgesic in patients suffering chronic pain such as that experienced in cancer or AIDS. However, since tetrahydrocannabinol is widely recognized as a drug of addiction and the private cultivation of the plant is usually prohibited, therapeutic use of self-grown preparations is a contentious socio-legal issue. (See MARIJUANA). (IP)

**THE SPECIAL SENSES** : See SENSES.

**THERAPEUTIC**: Adj., having curative properties/value. (JA)

**THERAPEUTIC ABORTION**: See ABORTION.

**THERAPEUTIC CLONING**: Medical and scientific applications of cloning technology, which do not result in the production of genetically identical fetuses or babies. (JA)

**THERAPEUTIC PROTEINS** : Proteins with curing property, pharmaceutically useful proteins, to cure deficiency/defect. E.g. Insulin to cure diabetics . These are pharmaceutical proteins developed directly from DNA sequences for medical applications in human beings. ( See PROTEINS, AAT, VACCINES). (JA)

**THERAPEUTIC RESEARCH** : Research that is intended to benefit the subject on whom it is performed. (DM)

**THERAPY**: The provision of remedies in the treatment of disorders or illnesses. (DM)

**THERMODYNAMICS**: The branch of physics dealing with heat energy. A wide interpretation identifies four laws of thermodynamics: zero - no exchange of heat in contact is thermal equilibrium; first law - energy can change form but is conserved; second law - entropy always increases in a closed system; third law - absolute zero Kelvin is the minimum possible temperature. (See ENERGY, TEMPERATURE) (MP)

**THEOCENTRIC** : A concept of believing God created all creatures, considers human beings in God's image, attributes stewardship of human beings to biosphere resources/maintenance. God as the object of worship, control of one's action in day to day life. For example some views include: Christian - biosphere and all organisms a creation of God, including human beings in God's image, detailed in Genesis account of creation. Have "dominion" *Genesis* Chapter 1:28 may mean either "rule over" (stewardship) or "taken over", indicates the idea of relatedness of all life forms and to do good to them all. A purpose oriented created. Jains - A view of creation similar to the account given in Bible. Hindu - Vedic period concept holds nature is divine, worshipped, revered, Rivers and mountains named as gods and goddesses, regarded plants as divine, provided animals as vehicles to male gods. (JA)

**THERMOLUMINESCENCE DATING** relies on quartz timing which depends on the counting of electrons trapped by naturally-occurring mechanical forces in the mineral of interest. These electrons are trapped at a regular rate and are released by the sunlight's energy (zero time) b proportional to the tee OPTICAL DATING and RADIOCARBON DATING). (IP)

**THIRD PARTY:** An independent observer or mediator outside of the immediate conflict or decision. Third parties should remain balanced, independent, facilitative and engage in analytical rather than bargaining dialogue. (See MEDIATION, FACILITATION, NEGOTIATION) (MP)

**THIRD PARTY CONSENT :** Informed consent given by someone other than the patient or research subject. (DM)

**THIRD WORLD:** A term used in international political economics to refer to parts of Africa, South America, Asia and the Pacific characterized by low levels of wealth, literacy, health, military stability, productivity, food security, welfare and wellbeing. ‘ *Tiers-Monde* ’ was popularized by Georges Balandier and Alfred Sauvy (1950s) as a politically-oriented terminology, differentiating also the democratic capitalism of the First World from the command economies of the Second World. The descriptive system has endured despite criticism and great diminution of the ‘Second World’ after the collapse of the Soviet Union. Other descriptive terms include ‘South’, ‘Less Developed Country’ and ‘Developing Country’. The forgiveness t progress issues protection of tropical rainforests, sustainable development, capacity building and peace building. (See DEVELOPING NATIONS, FIRST WORLD, SECOND WORLD, FOURTH WORLD) (MP)

**THIRD WORLD NATIONS:** Countries who belong to the THIRD WORLD.

**THOMAS AQUINAS** see AQUINAS, THOMAS.

**THREATENED SPECIES:** A species which is in danger of becoming extinct. Threatened species include members of any of the following three categories: Vulnerable, Endangered or Critically Endangered. (See ENDANGERED SPECIES) (MP)

**THREE MILE ISLAND:** Pennsylvania site of a nuclear energy reactor accident in March 1979, in which partial meltdown of the core caused radioactive leakage and came close to a ‘China syndrome’ on the scale of Chernobyl if it had not been cooled in time. (See CHERNOBYL, CHINA SYNDROME) (MP)

**THRESHOLD:** An edge, entrance or starting point; the point at which some process begins, comes true or ceases; the minimum strength at which a stimulus is perceived. (See THRESHOLD MANAGEMENT) (MP)

**THRESHOLD MANAGEMENT:** A concept with applications to biodiversity conservation, pollution chemistry, environmental management and economic analysis, in which the approach of indicators towards certain thresholds is monitored to regulate the impacts of a management policy which can be adapted accordingly. Using an example from fisheries management, commercial fishing would continue until stocks reach an ecologically-determined "sustainable" population threshold at which point harvesting would cease. The "acceptable biological catch" is always above the threshold within which species can regenerate their populations, and "overfishing" refers to harvesting beyond this threshold. (See SUSTAINABLE FISHING, SUSTAINABLE MANAGEMENT, ADAPTIVE MANAGEMENT) (MP)

**Ti PLASMID :** Tumor inducing plasmid found in the bacterium *Agrobacterium tumefaciens* - Ti plasmid can be transferred to a plant cell so as to induce a tumor - a bacterial gall, which is a hard globular outgrowths on the leaf. (JA)

**TIBETAN BOOK OF THE DEAD:** See BOOK OF THE DEAD

**TIDAL ENERGY :** The generation of renewable power by using the movement of the tides to drive an electricity generator. Such power stations require a large tidal range and should maintain respect for intertidal ecologies. (See OCEAN POWER, WAVE POWER, RENEWABLE ENERGY) (MP)

**TIME:** (See Change, Space, Relativity)

**TIME HORIZON:** The distance looked into the future when a person, government or management authority makes decisions. The impacts of decisions and policy often affect society or the environment well beyond the time horizon. (See INTEGRATED MANAGEMENT, STOPGAP MEASURES) (MP)

**TIME LAG:** A period of time after causal agents have been active but before which repercussive effects have begun to have noticeable impact. Examples include biological or chemical effects on the body, or the impacts of pollution or climate change on aspects of the environment. The time lag may induce a false sense of security, increasing the likelihood of the passage of critical thresholds. (See TIME-SERIES DATA, THRESHOLD) (MP)

**TIME SERIES DATA :** Information gathered over an extended time period such that natural processes of change and temporal fluctuations in parameters may be monitored. The Environmental Impact Assessment process has been criticized on the grounds that it only provides a snapshot in time rather than the time-series data essential for integrated and adaptive long-term management. (See ENVIRONMENTAL MONITORING, BEFORE/AFTER CONTROL/IMPACT METHODS, ADAPTIVE MANAGEMENT) (MP)

**TIPITAKA:** Scriptures of Theravada Buddhism, also known as the "Pali Canon", containing the philosophy of Buddha, or Siddhartha Gautama (563-483 BCE). Verbal Canon completed by 252 BCE, but not fixed in writing until perhaps the 1st Century BCE. (MP)

**TISSUE BANK:** See BIOLOGICAL TISSUES BANKS.

**TISSUE CULTURE:** The propagation of tissue removed from organisms in a laboratory environment that has strict sterility, temperature, and nutrient requirements.

**TISSUE PLASMINOGEN ACTIVATOR (tPA):** A genetically engineered protein drug that helps to dissolve blood clots in patients who have suffered heart attacks. (DM)

**TNT :** The yellow solid TNT (2,4,6-trinitrotoluene) is a conventional high explosive used in warfare, mining and movies. The explosive yield of a bomb is measured in terms of equivalent TNT. (See EXPLOSIVE YIELD) (MP)

**TOBACCO :** Plant of the genus *Nicotiana* in family *Solanaceae* from which smoking and chewing tobacco, cigarettes, cigars and snuff are manufactured. There are over 50 varieties of the plant but only a few are used for smoking purposes. *N. babacum* and *N. rustica* are the most important commercially. *N. rustica* was cultivated by the ancient Mexicans and by the North American First Nation peoples. (See NICOTINE, SMOKING, ADDICTION). (IP)

**TOCOPHEROL :** See VITAMIN E.

**TOLERANCE** the disposition to be fair towards those whose opinions or practices differ from one's own - freedom from bigotry. (IP)

**TORAH:** (from the Hebrew root y.r.y., meaning "to guide, to teach"). The primary meaning of this word is "teaching", and so one finds in the

Hebrew of the Old Testament expressions such as "this is the torah (teaching) as regards the burnt offering", "this is the torah regarding one who is afflicted with tzara'at (a skin condition)". The most common derived meaning from this is the teachings contained in the first five books of the Old Testament (Genesis through Deuteronomy). These five books are known together as Torah (with a capital T). According to Jewish tradition, the Torah in this second meaning, was received from God at Mount Sinai by Moses in its entirety. For this reason, the Torah is the most sacred of Jewish books, and the study of Torah is central to Jewish tradition. In a more general meaning than this, the word Torah has also been applied to the Oral Tradition of the rabbis, and so, there is reference made to Oral Torah (i.e. teaching of the rabbis) and Written Torah (i.e. the five books received by Moses). Because of this more general meaning, the word Torah is sometimes used to mean "Jewish teachings" in general. In the Quran and other Muslim sources, the word "Tawrat" (the Arabic equivalent of "Torah") is used to refer to the entirety of the Old Testament, rather than exclusively referring to the five books of Moses. (AG)

**TORTS** : In law, private or civil wrongs, other than breach of contract, for which the courts will provide a remedy in the form of an action for damages. A private or civil wrong resulting from a breach of a legal duty that exists by virtue of society's legal expectations regarding interpersonal conduct, rather than by virtue of a contractual agreement. (DM)

**TOTAL ALLOWABLE CATCH (TAC)** : The overall allowable fishing catch in accordance with a sustainable fishery management plan. Fishing may be regulated by closing the fishery when TAC is reached, or by the allocation of portions of TAC as fishing quotas. (See SUSTAINABLE FISHING, THRESHOLD MANAGEMENT, FISHING QUOTA) (MP)

**TOTAL CATCHMENT MANAGEMENT (TCM)**: TCM is an environmental management policy which emphasizes the centrality of water and that water catchments are a useful bioregion for implementing management. Integrated natural resource management should be based upon fundamental processes and boundaries such as the water cycle, drainage system, river catchments, and ecological and human water requirements. TCM also has social components, sometimes requiring inter-governmental/multidisciplinary collaboration, often in committees including scientific, government, developer, landholder, local and indigenous representatives. Issues include fairness in water utilization/regulation/ownership, downstream water quality/pollution, sustainability issues, and adequacy of water for freshwater/riparian/floodplain ecologies. (See INTEGRATED MANAGEMENT) (MP)

**TOTEM**: see TOTEMISM.

**TOTEMISM** 1. a view that an object or emblem, especially sacred animal or religious image, stands in a special relationship to a specific person, familial group or clan, and which galvanizes rituals intended to unite (see Animism) 2. For the Australian Aboriginal, totems create the spiritual link between humans and all the things in Nature and the Dreaming; for example, if a person has a special spiritual link with an emu the emu becomes that person's totem which provides the connection to the sign as to which Dreaming their child will not, insect will not die out (it is forbidden to eat one's totem), totemism becomes a potent conservation strategy enforcing responsible stewardship of species. (IP)

**TOTIPOTENCY**: This represents the capacity (potential) of a cell or a cluster of cells to produce the whole (total) embryo and fetus with all its extraembryonic membranes and tissues. Pluripotency or multipotency is similar but is restricted to represent the capacity to produce a variety of parts and tissues but not the whole embryo and fetus. (DM)

**TOTIPOTENT** : (Latin: *totus* 'whole, entire' + *potens* 'powerful') A single cell has full genetic potential to become a complete organism during any stage in life process, cells capable of reproducing themselves continually. A term proposed by the German botanist Gottlieb Heberlant in 1902. (JA)

**TOUCH** : (French *toucher* 'to touch'). The tactile sense or the ability to feel objects and to distinguish their various characteristics. A lack of tactile stimulation, especially in early infancy, may lead to serious developmental and emotional disturbances. For example, massaged babies gain weight as much as 50% faster than unmassaged babies and are more active, alert, aware of and responsive to the environment, are able to tolerate noise and orient themselves faster as they are emotionally more in control. (See SENSES). (IP)

**TOURISM**: See SUSTAINABLE TOURISM, LEISURE.

**TOWER OF SILENCE**: The place to which the dead bodies of humans are brought according to Zoroastrian tradition. In such towers, the body is neither buried nor cremated, because both earth and fire have special sanctity in Zoroastrian tradition. So, in order not to pollute either of these, the body is placed in a tower which is open at the top. Then, through a combination of the process of decomposition and scavenging birds, eventually only the bones remain. (AG)

**TOXIC** : A chemical or physical agent that produces an adverse effect on an organism/a biological system, a poison (JA+SG2)

**TOXIC CHEMICALS** : A substance or a chemical product which can cause a harmful effect in humans and in other organisms. It could be a substance that cause a concern for humans due to its possible developmental effect or due to its nature to impair human fertility or both. (See TOXIN). (JA).

**TOXICITY TESTING**: The use of experimental procedures to determine the levels at which exposure to a material leads to adverse effects in test subjects, the characterization of such induced effects and the elucidation of mechanisms of action by which effects were induced. (DM)

**TOXICOLOGY**: The study of the adverse effects of chemical and physical agents on living organisms. Examples of toxicology are the study of effect of lead on the developing nervous system, the environmental effects of mercury, loud noise on hearing, or the effects of radiation. (JA+SG2)

**TOXICOLOGIST**: A scientist that studies the adverse effects of agents on biological systems. (SG2)

**TOXICANT (poison)**: An agent cable of causing toxicity or adverse effects on an organism. (SG2)

**TOXIN**: Most often, a toxic peptide or protein capable of eliciting antibody production. A natural biological agent (from plants, animals, bacteria or fungus) that causes toxicity. A toxicant is a substance that has been shown to present some significant degree of possible risk when consumed above safe limits by animals. See *endotoxin* and *exotoxin* . A harmful substance - poisonous substance Algal - bioactive compounds produced by algae with toxic effect, e.g. Red tide - diatom algae Trichodesmium produces paralytic and diarrhoetic shellfish poisons. For example, domoic acid found in shellfish, nicotine in tobacco leafs, caffeine in cola nuts or snake venom. (DM, JA)

**TRACY** : A GMO (LMO) sheep, product of Roslin Institute, PPL-Therapeutics produced her progeny, has human gene coding AAT protein to produce in her mammary gland. See also Dolly and Polly. (JA)

**TRADE EFFLUENTS**: Any liquid, gaseous or solid substance which is discharged from any premises used for carrying on any industrial operations or process or treatment and disposal system other than domestic sewage. (JA)

**TRAGEDY OF THE COMMONS**: *The Tragedy of the Commons* is a famous essay authored by Garrett Hardin. It is an argument for private



ownership as a means of conserving resources. Hardin envisages an area of common land on which animals are kept for grazing by a number of herders. It is to the advantage ( *sensu* self interest) of any one herder to increase the number of animals he keeps on the commons. So all do. But this leads to overgrazing and irreversible damage to the commons. The tragedy of the commons has been repeated a thousand times. We overfish, we cut down too many trees, we extract too much freshwater from aquifers and so, through human selfishness, we ruin much of what is held in common ownership. (MR)

**TRAIT** : Phenotypical and genotypical characters in plants and animals, vary in degree they are expressed. Exhibited desired traits selected empirically for improvement. E.g. Shape and size of cultivated plants, domestic ornamental plants and animals with disease resistance. (JA)

**TRANQUILITY** : A peaceful, serene setting, often natural sounds and surrounds which soothe the mood and calm mind and body. (See PEACE, SHANTI) (MP)

**TRANS-** : Combining prefix from Latin, *trans* means ‘across’, ‘beyond’. (See META-, MULTI-, INTER-, MEGA-) (MP)

**TRANSCENDENTAL MEDITATION**: (See MEDITATION)

**TRANSCRIPTION**: The synthesis of mRNA from a sequence of DNA (a gene); the first step in gene expression. Compare *translation* . (DM)

**TRANSDISCIPLINARY** : (Trans- 'beyond') An approach in which the problem-solving process is the primary consideration, and information from any relevant profession or discipline may be incorporated into the solution process. This is distinct from inter- or multidisciplinary approaches which originate among disciplines. (See MULTIDISCIPLINARY, INTERDISCIPLINARY, ENLIGHTENMENT THINKING) (MP).

**TRANSDUCTION**: The transfer of genetic material from one cell to another by means of a virus or bacteriophage. (DM)

**TRANSFER RNA, tRNA**: A class of RNA having structures with triplet nucleotide sequences that are complementary to the triplet nucleotide coding sequences of mRNA. The role of tRNAs in protein synthesis is to bond with amino acids and transfer them to the ribosomes, where proteins are synthesized according to the instructions carried by mRNA. Chemical (transfer ribonucleic acid) responsible for carrying individual **AMINO ACIDS** (q.v.) within a cell so that **PROTEINS** (q.v.) of the appropriate type can be assembled from instructions provided by **GENES** (q.v.). (DM+MR+GK)

**TRANSFORMATION**: Introduction and assimilation of DNA from one organism into another via uptake of naked DNA. (DM)

**TRANSGENIC** : An organism (can be plant or animal) in which a foreign gene (a transgene) or DNA sequence, is incorporated into its genome early in development. The transgene is present in both somatic and germ cells, is expressed in one or more tissues, and is inherited by the offspring. A variety containing a foreign gene with the process of genetic engineering - from one species to another. Commonly refers to movement of genes between unrelated species, plants, animals, bacteria, humans, unknown in nature, mediated by humans through genetic manipulation. (DM, JA)

**TRANSGENIC ANIMALS**: Animals whose hereditary DNA has been augmented by the addition of DNA from a source other than parental germplasm usually from another animal or a human, in a laboratory, using recombinant DNA techniques. Research in this field is done many species. (DM)



**TRANSHUMAN CONDITION:** See FUTUROLOGY, HUMAN EXTINCTION.

**TRANSLATION SOFTWARE:** Computer programming which allows instantaneous machine translation between human languages, including several automated online systems. Research since the 1950s has led to the current point of conjunction between speech recognition, machine translation and the internet. Examples of technology include interactive online Systran translation, real-time Japanese/English cellphone translation, and wearable translation computers for army personnel. The Universal Translator will revolutionize accessibility to information and cultural exchange. English will no longer be the default language, creating a truly global business and communications infosphere. (See VOICE RECOGNITION, VIDEO CONFERENCING, INFOSPHERE) (MP)

**TRANSNATIONAL MOVEMENT OF POLLUTANTS** Trans-boundary movement of a Hazardous waste- substance from a jurisdiction of one nation to another or to or through an area not under the national jurisdiction of any country- at least two countries are involved in the movement. E.g. Chernobyl nuclear fall out. (JA)

**TRANSLATION:** The process in which the genetic code carried by mRNA directs the synthesis of proteins from amino acids. Compare *TRANSCRIPTION* . (DM)

**TRANSLOCATION:** The transfer of genetic material from one chromosome to another. An exchange of material between two chromosomes is referred to as a 'reciprocal translocation'. (DM)

**TRANSNATIONAL CORPORATION:** A corporation across more than one country. (See MULTINATIONAL CORPORATION). (DM)

**TRANSPLANTATION** : involves the removal of an organ/s, tissue/s or cell/s from one donor organism and transplanted to another (JA)

**TRANSPOSABLE ELEMENT:** A class of DNA sequences capable of insertion into a genome at numerous positions, and of moving from one area of a genome to another area or another genome. (DM)

**TRANSSEXUALISM** : A condition in which a person's gender identity is opposite to the biological sex. Transsexuals are convinced, even though the body chromosomes, internal and external reproductive organs and fertility may be normal, that they actually belong to the opposite sex. Many transsexuals choose to undergo gender reassignment operations to alter their external sexual characteristics. Transsexualism should not be confused with homosexuality or transvestism. (See TRANSVESTISM, HOMOSEXUALITY). (IP)

**TRANSPOSON:** A type of transposable element incapable of autonomous existence, often shuttling genetic material back and forth between cell chromosomes, between smaller replicons, and between chromosomes and replicons. (DM)

**TRANSSEXUAL** : See TRANSSEXUALISM.

**TRANSVESTISM** : The tendency of dressing in clothes of the opposite sex in order to attain psychic and erotic relief/pleasure. (See TRANSSEXUALISM, HOMOSEXUALITY). (IP)

**TRANSVESTITE:** See TRANSVESTISM.

**TREATMENT GROUP:** See EXPERIMENTAL GROUP

**TREATMENT OUTCOME** : The results of clinical interventions in terms of patient health or quality of life. (DM)

**TREATMENT REFUSAL** : Refusal of treatment by an individual or by a third party authorized to make decisions on behalf of a legally incompetent person. (DM)

**TREE PLANTING:** The planting of trees has numerous environmental and human benefits other than the provision of timber. These include restoration of habitat and ecology, increased biodiversity, provision of wildlife corridors, stabilisation of soil erosion, reduced soil salinity, greater land fertility, sun shelter, wind-breaks, a carbon sink and source of fresh oxygen, and increased ecological and economic worth. This is in addition to the intrinsic, aesthetic and spiritual values of trees. Tree planting programs should aim for a diversity of local native species rather than stands of a single introduced species such as timber pines, and involve research, seeding, nursery, planting, watering, ecological surveying, monitoring and maintenance. (See AGROFORESTRY, BIOREMEDIATION, ENVIRONMENTAL COMPENSATION, PERMACULTURE, RESTORATION ECOLOGY) (MP)

**TREPHINATION:** (Trepanation)- A surgical practice which became highly developed in South America in ancient times, between 500 bce and 500 ce. This practice involved the removal of parts of the skull without damage to the brain tissue beneath it. Trephination was employed in order to relieve certain medical conditions or to alleviate symptoms thought to be caused by malignant spirits. (AG)

**TRIBE** . A group of aboriginal living in close community. As this term has sometimes been used in a scornful way referring to these people and their culture, it is presently being replaced by ethnic group. (GK)

**TRIBALISM, ENLIGHTENED** : Tribalism is loyalty to one's own local extended family, community and culture. Unenlightened tribalism is xenophobic, and resists any understanding, love or moral responsibility towards the rest of the world. Universalism emphasises the global culture, internationally shared values and solidarity of all humans. But universalism ignores the unique contributions to spirituality, culture and bioethics of local and tribal cultures. Enlightened Tribalism strives to combine the best of Tribalism and Universalism, developing relationships among family and neighbours, developing local spirituality, while recognising our moral duties towards, and solidarity with the rest of the world, and while being open to learning from other cultures.(FL)

**TRICYCLIC ANTIDEPRESSANTS:** See SEROTONIN RE-UP TAKE INHIBITORS.

**TRIDOSA:** (Three dosas) These are the three "humors" of the Ayurvedic system of medicine (see Ayurveda, Humor). Each one represents a different mixture of elements, and therefore a different physical disposition, and personality. These three dosas are known as vata, pitta, and kapha, representing air, fire and water-earth respectively. The treatment of different conditions in Ayurveda is based on maintaining balance of the three dosas, and imbalances in the dosas are said to be the origin of diseases. This also results in different diets recommended for people of different dosa orientation.( AG)

**TRIPLE BOTTOM LINE:** The performance of a company is usually measured by the bottom line (profits), however the trend towards more integrated accounting for sustainable development has created the concept of the triple bottom line. This refers to the more rounded, reasonable inclusion into any assessment of an organization's accomplishments, of 1) the environmental impacts and 2) the social outcomes, along with 3) the economic dimension. (See SUSTAINABLE CORPORATION, SUSTAINABLE DEVELOPMENT) (MP)

**TRIPLOIDY:** Three complete sets of chromosomes per cell. Ten percent of spontaneous abortions show this type of chromosomal aberrations, which are not viable. (See ABORTION). (GK)

**TRIPS AGREEMENT:** Agreement on Trade related Aspects of Intellectual Property Rights. The agreement provides a mandatory standards as to which subject matter is eligible for patent protection, as well as in respect of the contents, limits and the term of protection, However, it does not refer to genes. The TRIPS agreement is applicable to all the 144 WTO member states. (JA).

**TRISOMY** : Tri (three) soma (body), presence of an extra chromosome, making a total of three of one kind eg. Trisomy 21 aneuploidy in humans with Down syndrome. One chromosome is found in three copies. Trisomies can be due to non-disjunction of a pair of chromosomes during meiosis, or to translocations. In both cases, one gamete contributes an extra copy of that chromosomes. Unlike monosomies, many trisomies are viable, the most frequent being the 21 trisomy (Down syndrome, 0.13% in newborns) and the sex chromosome trisomies (Klinefelter XXY, 0.09%; XXX, 0.1%). (JA+GK)

**TRITICALE**: Aout the world. (JA)

**tRNA** (See TRANSFER RNA).

**TROPICAL RAINFOREST**: Tropical closed moist forests dominated by broad-leaved evergreen trees. The most diverse biome on Earth, tropical rainforests cover only 6% of the surface of the Earth but are thought to contain more than half of all species. The treetops are layered into several canopies which form a dense habitat and prevent 90% of the sunlight from reaching the ground. Tropical rainforests typically receive some 200 centimeters of annual rainfall without distinct changes in climate between seasons. Rainforest biodiversity is based on a very tight recycling of mineral nutrients, most of which are tied up in the vegetation and recycled by means of symbiotic relationships between microorganisms and host plants. Because of natural cycling and reuse of nutrients, luxuriant rainforests can grow on soils that an agriculturist would regard as infertile unless supplied with large amounts of fertilizers. (See BIODIVERSITY, CANOPY, RAINFOREST DESTRUCTION, SYMBIOSIS, TEMPERATE RAINFOREST). (MP & IP)

**TROPOSPHERE** : The region of the atmosphere between the Earth surface and the stratosphere, which begins at approximately 17 km altitude in the tropics and subtropics but only at about 10 km altitude at higher latitudes. The troposphere is characterized by dropping temperature with increasing altitude and is the zone in which virtually all the water vapor in the atmosphere is located. (See OZONE; OZONE HOLE; STRATOSPHERE). (RW+IP)

**TRUTH DISCLOSURE** : Truthful revelation to a patient or the patient's family of the patient's diagnosis or prognosis, errors in treatment, or other ``bad news" (differentiate from DISCLOSURE, which is used in the context of communicating to patients or research subjects information about risks and benefits or alternative approaches to treatment or experimentation). (DM)

**TRUTH SERUM** : A drug used for the purpose of eliciting information. Chemical interrogation is sometimes attempted during wartime or for national security purposes, and often military or terrorist prisoners have been trained in interrogation-resistance. The ethical and legal status of the use of such drugs is debatable - they are probably used more for criminal purposes than for criminal prosecution. An example is sodium pentothal, with which greater truthfulness is induced by decreasing inhibition to the vocalization of thoughts. (MP)

**TUBE FEEDING**: See ARTIFICIAL FEEDING.

**TUE TINH**: (1255-1399) Vietnamese Buddhist priest and physician. Considered the "heavenly authority on Southern medicine" (Thanh thuoc nam). Vietnamese medical tradition distinguishes "Northern" medicine (Chinese) and "Southern" medicine (native Vietnamese medical tradition. Tue Tinh's approach was to respect the Northern medical knowledge but to place the emphasis on Southern medical tradition. His two major works are "Nam duoc than hieu" (Miraculous effects of Southern Medicine) and "Thap tham phuong gia giam" (13 Medical Remedies and their variations). (AG)

**TULAREMIA** : A virulent bacterial disease caused by *Franciella tularensis* , infectious of rodents, transmitted by handling and eating of infected animals with irregular fever, aching and inflammations of lymph glands. (JA)

**TUNDRA:** Northern hemisphere circumpolar environment (very cold, low rainfall) and its ecological communities (mosses, sedges, insects, owl, caribou, polar/grizzly bears etc.) (See TAIGA) (MP)

**TURBIDITY :** An indicator of the cloudiness or suspended solid particulate matter in smog or muddy water; a commonly measured component of water quality. (See WATER POLLUTION) (MP)

**TURING TEST:** The ‘Turing Test’, looks forperator in something like holding a written conversation. It was Alan Turing who also founded modern computing in 1936 with his ‘Turing machine’. (See ARTIFICIAL INTELLIGENCE) (MP)

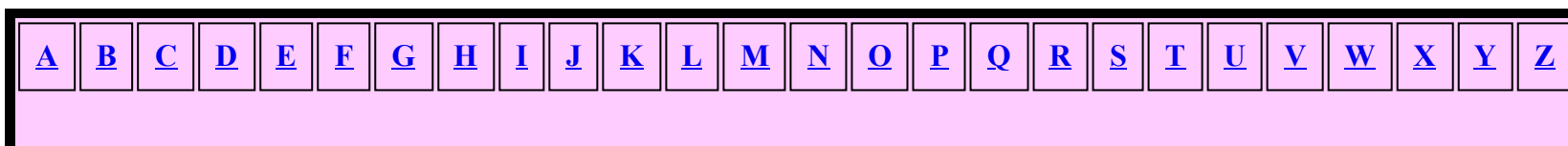
**TV:** See TELEVISION.

**TWINS/TWINNING :** Early embryo stem cells (blastomeres) are totipotent; that is, an isolated blastomere can give rise to an entire embryo, a property that is lost as differentiation proceeds. Human twins are classified into two major groups: fraternal or dizygotic, also called biovular, and identical or monozygotic, also called uniovular. Fraternal twins are the result of two separate fertilizations when two oocytes are shed in a single ovulation; identical twins are formed from a common embryo whose cells dissociated from one another. Identical twins (roughly 0.25% of human births) are produced by the separation of early blastomeres or by the separation of the inner cell mass into two regions within the same embryo. About 33% of identical twins have complete and separate placentae, indicating that separation occurred early in embryonic development. The remaining identical twins share a common placenta, suggesting that the split occurred later in the development of the embryo. If the split is incomplete the outcome is conjoined twins. (See CONJOINT TWINS). (IP)

**TYPE I ERROR:** In statistical method and scientific falsification, Type I Error (type-one error) is incorrectly rejecting a *true* null-hypothesis. For example, at significance level  $P=0.05$  there is a five percent chance of Type I Error. (See TYPE II ERROR, STATISTICAL SIGNIFICANCE, ANALYSIS OF VARIANCE) (MP)

**TYPE II ERROR:** In statistical method and scientific falsification, Type II Error (type-two error) is failing to reject a *false* null-hypothesis. Statistical power is the probability of Type II Error not occurring. (See TYPE I ERROR, STATISTICAL POWER, ANALYSIS OF VARIANCE) (MP)

## U



[TOP](#)[UPDATES](#)[EUBIOS](#)

**UAV:** Unmanned Aerial Vehicle

**UFO:** Unidentified Flying Object

**ULTRASOUND:** The use of high-frequency sound waves focused on the body to obtain a video image of internal tissues, organs and structures. Ultrasound is particularly useful for *in utero* examinations of a developing fetus, for evaluation of the development of ovarian follicles, and for the guided retrieval of oocytes for IVF and GIFT. (IP)

**ULTRAVIOLET RADIATION :** Light in the wavelength range roughly from 100 to 400 nm, which is invisible to the human eye. Ultraviolet radiation (UV) has higher energy than visible light and is strongly absorbed by DNA, which is damaged by exposure. In recent decades, UV irradiance has been increasing as chlorofluorocarbons released by industrial activities have depleted the Earth's stratospheric ozone layer, which acts as a UV shield. Detailed information and data can be obtained from the World Ozone and Ultraviolet Radiation Data Centre (<http://www.msc-smc.ec.gc.ca/woudc/>), which is part of the World Meteorological Organization's Global Atmosphere Watch program. (RW)

**UN :** See UNITED NATIONS.

**UNANI :** (meaning "Greek" in Arabic)- A Greco-Arabic system of medicine. This system is based upon classical Greek medicine and elaborated by Islamic scholars. Ibn Sinna's "Canon of Medicine" is a central work of Unani medicine. This system of medicine is practiced especially in India, Pakistan and Nepal. (AG)

**UNCED:** United Nations Conference on Environment and Development.

**UNCERTAINTY:** The condition in which validated scientific knowledge regarding risks, benefits, diagnosis, or prognosis is unavailable. Uncertainty is a constant and inherent feature of science, medicine, sociology, ecology, development and management. Uncertainty is the backdrop from which we unravel the information we place enough faith in to call knowledge. Uncertainties, limitations and negative results should be revealed rather than repressed in scientific journals and Environmental Impact Assessment. There have been many responses to dealing with uncertainty, for example in business (cost/benefit analysis), environmental management (precautionary principle, hazard prediction), social management (safety regulations, risk analysis) and international relations (military/economic strategy). *Risk* is where the system is reasonably well understood and quantification may be attempted on the probability of a future occurrence. *Uncertainty* is where the elements of the system are known but the probabilities of a chance occurrence are unknown. *Indeterminacy* is where the scientific or social context is not sufficiently understood to allow a problem to be determined - knowledge may be conditional on the validity of certain assumptions. *Ignorance* implies a lack of understanding of the system itself - we can't understand what we don't know. Methodological uncertainty is where the professional judgment may be uncertain because of inherent complexity, subjectivity, measurement inaccuracy, inappropriate scientific methods or assumptions. Statistical uncertainty exists because statistics are inferential and probabilistic. Epistemological uncertainty concerns understanding of the problem and appropriateness of the knowledge framework. (See IGNORANCE, PRECAUTIONARY PRINCIPLE, RISK ANALYSIS, UNKNOWABLE) (MP)

**UNCERTAINTY PRINCIPLE :** See HEISENBERG'S UNCERTAINTY PRINCIPLE.

**UNCONDITIONAL LOVE:** Love freely given and not restrained by conditions; especially important during childhood development in order to stabilize physical and spiritual wellbeing, and to promote the cycle of nurture and love through the generations. (See LOVE OF LIFE). (IP & MP)

**UNCONSTITUTIONAL:** Conflicting with the provisions of a constitution, usually the U.S. Constitution. Statutory provisions or particular applications of a statutory provision found unconstitutional are thereby rendered void.

**UNCSD:** United Nations Commission on Sustainable Development.

**UNCTAD:** United Nations Conference on Trade and Development.

**UNDCP:** United Nations Drug Control Programme.

**UNDP:** United Nations Development Programme.

**UNESCO :** United Nations Educational, Scientific and Cultural Organization. Founded in 1945, one month after the founding of the United Nations itself. The UNESCO headquarters is in Paris and there are 73 field offices and units spread over the world. Mission: "The main objective of UNESCO is to contribute to peace and security in the world by promoting collaboration among nations through education, science, culture and communication in order to further universal respect for justice, for the rule of law and for the human rights and fundamental freedoms which are affirmed for the peoples of the world, without distinction of race, sex, language or religion, by the Charter of the United Nations." <http://www.unesco.org/> (RW)

**UNEP :** United Nations Environment Program. Founded in 1972 to protect the environment and facilitate sustainable development. Mission statement: "To provide leadership and encourage partnership in caring for the environment by inspiring, informing and enabling nations and peoples to improve their quality of life without compromising that of the future generations." <http://www.unep.org/> (RW)

**UNFPA:** United Nations Population Fund

**UNHCR:** United Nations High Commissioner for Refugees

**UNICEF:** United Nations Children's Fund (formerly United Nations International Children's Emergency Fund).

**UNIDIR:** United Nations Institute for Disarmament Research

**UNIPOLAR DEPRESSION:** a mood disorder where the sufferers are never manic, though they may be what's called in common parlance a bit "hyper"; they're usually in varying degrees the particular mood disorder is the dominant problem. In a secondary depressive (marijuana, amphetamines, cocaine), extreme nutritional deficiencies and hypotension; however it's not clear to what TERS; SEROTONIN RE-UPTAKE INHIBITORS). (IP)

**UNITED:** (Latin: *unus* "one") Having joined or combined together; in agreement or alliance; a unified and integrated whole; acting as one in purpose, action or belief. (See SOLIDARITY, UNITY) (MP)

**UNITED NATIONS :** Founded by 51 countries in October 1945 to promote peace and cooperation internationally; presently 189 member

countries. The General Assembly is the main governing body; each member country has one vote. General assembly decisions are by simple or 2/3 majority for regular or 'important' matters. The 15-member Security Council has responsibility for matters related to peace and security. China, France, the Russian Federation, the United States, and the United Kingdom are permanent Security Council members; the other 10 members are elected by the General Assembly for 2-year terms. <http://www.un.org/english/> (RW)

**UNITY:** (Latin: *unus* "one") The condition of being one unified whole composed of many different parts or peoples, associated by a common bond such as that of humanity, and connected in mutual agreement, tolerance and harmony. (See SOLIDARITY, TOLERANCE, UNITED) (MP)

**UNIVERSAL DECLARATION OF HUMAN RIGHTS :** Global constitutional document outlining human rights for the whole of humanity, adopting and preserving a "common standard of achievement for all peoples and all nations". Prepared by the Commission on Human Rights, set up by the United Nations Economic and Social Council chaired by Eleanor Roosevelt, it was adopted by the United Nations General Assembly in December 1948, with 48 member states voting in favor and 8 against, and has been adopted by many more countries since. The thirty articles of the declaration cover areas summarized as follows: Article 1. All humans are born free and equal in dignity and rights, 2. entitlement to rights without distinctions of race, color, sex, language, religion, politics, nationality, property, birth or other status, 3. right to life, liberty and security of person, 4. prohibition of slavery and servitude, 5. prohibition of torture and inhuman treatment, 6. right of recognition before the law, 7. equality before the law, 8. right to an effective legal remedy, 9. prohibition of arbitrary arrest, detention or exile, 10. right to an impartial tribunal hearing, 11. presumed innocent until proven guilty, 12. protection against arbitrary interference with privacy, family, home, correspondence, honor or reputation, 13. freedom of national and international movement, 14. right to foreign asylum from political persecution, 15. right to a nationality, 16. right to consenting marriage and protection of the family unit, 17. right to own property, 18. right to freedom of thought and conscience, choice of religion and freedom to teach, practice and worship, 19. right to freedom of opinion and expression and right to seek, receive and impart information through any media, 20. right to freedom of peaceful assembly and association, 21. access to government, public service and genuine elections expressing the will of the people, 22. right to social security, 23. right to work, free choice of employment, equal pay for equal work and trade union membership, 24. right to rest and leisure, 25. standards of living adequate for health, wellbeing, security and child protection, 26. free elementary education and access to higher education on the basis of merit, 27. right to participate in the arts, science and cultural life, with protection of author interests, 28. right to an international social order able to realize these rights and freedoms, 29. everyone has duties to their community and is subject to laws which respect general welfare and the rights and freedoms of others, and 30. discouraging any act aimed at the destruction of these rights and freedoms. (See HUMAN RIGHTS) (MP)

**UNKNOWNABLE:** Scientific knowledge is gained through testability and falsification using experiments and statistics. The limitations of science become apparent when dealing with subjects outside of the applicability of scientific method. These subjects of philosophical abstraction, great complexity and metaphysical belief are really unknowable unless they can be sufficiently justified or validated. There are operational barriers to the process of ultimate proof. Awareness of this leads to the philosophical response of the agnostic: "I don't know." (See KNOWLEDGE, PROOF, UNCERTAINTY, IMPOSSIBILITY, IGNORANCE, SCIENTIFIC METHOD, FALSIFICATION, INDUCTION, BEST AVAILABLE INFORMATION, AGNOSTIC) (MP)

**UNSUSTAINABILITY:** Unfortunately, perhaps the majority of current human activities are non-sustainable, so it may be easier or more

appropriate to measure 'unsustainability'. Approaching thistics and impacw towards unsuY, SUSTAINABLE DEVELOPMENT) (MP)

**UNU:** United Nations University.

**UNV:** United Nations Volunteers.

**UPANISHADS:** (Sanskrit: 'sitting beneath') Sacred literature of Hinduism comprising many disparate writings, often referred to as the 'Vedanta' (or 'End of the Vedas'), composed in She Brahman and A tman. (See Vedas ) (MP)

**URANIUM:** Chemical element with atomic number 92, existing in two isotopes  $^{235}\text{U}$  (0.7%) and  $^{238}\text{U}$  (99.3%). Uranium is radioactive, for example  $^{238}\text{U}$  emits alpha and gamma radiation and has a half-life of  $4.5 \times 10^9$  years. (See YELLOWCAKE, RADIOACTIVITY) (MP)

**URBAN CONSOLIDATION:** The increased development of high-density housing in inner city areas. Urban consolidation is a result of the urbanization common in overpopulated, underdeveloped countries. Urban consolidation results in increased traffic congestion, pollution, noise, crowding and reduced privacy. It is however an attempt to manage other risks and processes of urbanization, such as the prevention of urban sprawl and the conservation of adjacent National Parks. Urban consolidation should develop parallel infrastructure and amenities, locate along public transport routes, and utilize cleaned-up industrial areas rather than green areas in order to retain adequate recreational sites and suburban parklands. (See URBAN SPRAWL, URBANIZATION, SLUMS, SUSTAINABLE CITIES) (MP)

**URBAN RENEWAL:** The process of remodeling and redevelopment of slums and shanty-towns, and the gentrification and modernization of residential areas and the central business district. (See URBANIZATION, MODERNIZATION, SLUMS) (MP)

**URBAN SPRAWL:** The spread of urban and suburban landscapes across a wide geographical area surrounding a city. Multiple nodes may emerge which function as secondary central business districts. Cities may obliterate coastal ecosystems by stretching along the coastline until they form a continuous suburban strip to adjacent towns. The American and Australian Dreams of the family home on a quarter-acre block have exacerbated the problem of urban sprawl. (See URBAN CONSOLIDATION, URBANIZATION, SUSTAINABLE CITIES) (MP)

**URBANIZATION:** The process of human movement and centralization towards and into cities and urban areas, with the associated industrialization, urban sprawl and lifestyle of urbanism. Often impoverished, landless or hopeful people may see limited rural opportunities or be driven from the land by increased mechanization of agriculture. Flight to the bright lights of the city often ends as a fringe life of shanty-towns, unemployment and crime. At the same time, cities are centers of opportunity, education and social mobility, and urban areas may undergo renewal, gentrification and modernization. (See INDUSTRIALIZATION, MODERNIZATION SLUMS, SHANTY TOWN, URBAN SPRAWL, URBAN RENEWAL) (MP)

**USAID:** United States Agency for International Development

**USDA United States Department of Agriculture :** Founded in 1862 by President Abraham Lincoln. Responsible for conservation on private



lands, stewardship of national forests, agricultural research, food safety, etc. <http://www.usda.gov> (RW)

**USE VALUE:** The value of the natural environment derived from its actual utilization by humans. The useful value of a resource may motivate conservation or may promote its development and destruction. Examples of direct use values include harvesting of timber and seafood, and indirect use values, or passive values, include recreation and functions towards the human ecosystem such as carbon fixation. This illustrates the difficulties of distinction and evaluation when it comes to the complex interdependency of humans with ecosystems. Use values may also include option value and bequest value, but exclude existence value and intrinsic value. (See INTRINSIC VALUE OF NATURE, INSTRUMENTAL VALUE OF NATURE, OPTION VALUE, BEQUEST VALUE, EXISTENCE VALUE, ENVIRONMENTAL VALUATION) (MP)

**USER-PAYS PRINCIPLE:** (See ECOLOGICAL ECONOMICS)

**USPTO :** United States Patent and Trademark Office A governing body for granting Patents on novel inventions. The patenting regime in USA, is different from the EPO. A patent can be challenged through litigation or a request can be made for reexamination. (JA)

**UTERUS :** (Latin *uterus* 'womb'). The pear-shaped reproductive organ in which the conceptus is implanted and the fetus develops, and from which the menses flow. In women it is a single muscular organ positioned between the bladder and the rectum with its cylindrical neck, or cervix, being directed towards the vagina with which it communicates. The wider portion receives the oviducts or Fallopian tubes at its two upper angles in close proximity to the ovaries. The uterus is a common site of tumors - both benign and malignant. The commonest benign tumors are fibroids while, typically, cancer of the uterus appears at an older age with a common symptom being postmenopausal bleeding. Surgical (hysterectomy) at an early stage of the disease is usually a cure. (IP)

**UTILITARIAN:** The view that an action is deemed morally acceptable because it produces the greatest balance of good over evil taking into account all individuals affected. (See UTILITARIANISM). (DM)

**UTILITARIANISM** 1. The belief that the value of a thing or an action is determined by its utility; ethical theory arguably proposed by Mo Tzu (China 6<sup>th</sup> century BC), and in Modern Times by Jeremy Bentham (1748-1832) and James Mill (1808-1873) that all actions should be directed toward achieving the greatest happiness for the greatest number of people 2. political theory that aids in the decision process by endorsing the course of action that produces the greatest utility for the majority of individuals. (DM)

**UTILITARIANISM, ACT AND RULE :** Act Utilitarianism teaches that to be ethical is to do acts, which will produce the greatest good for the greatest number of people. *Good* is defined as happiness, and happiness is defined as pleasure. Rule Utilitarianism teaches that to be ethical is to act according to rules, which are such that if all or most people were to adopt these rules then the greatest good would be produced for the greatest number of people. It has often been debated whether there is really any practical difference between these two versions of Utilitarianism.

Regardless of which version one adopts, the doctrine -- as was pointed out by Mahatma Gandhi -- simplistically implies that one may do bad to a minority in order to produce the happiness of the majority. Gandhi therefore rejected it in favour of the idea that we should try to do the best for everybody. Whether this is practically achievable is another question. The simplistic application of Utilitarianism seems to some people to imply that we may kill neonates with serious anomalies, and refrain from trying to help brain-injured patients recover from the

Persistent Vegetative State, in order to save the cost to society of their treatment. Simplistic formulations and applications of Utilitarianism, however, may not be faithful to Mill, himself. Mill's book, *Utilitarianism*, was a deep work of philosophical thought, showing sensitivity to, and a willingness to face nuances and exceptions in the spirit of philosophy.

A more recent utilitarianism, the bioethicist, Peter Singer, argued that it is SPECIESISM (q.v.) to formulate utilitarianism merely for the good of the greatest number of people. All beings, which are capable of suffering, should be taken into consideration. Thus, he argued that the phrase: *the greatest number of sentient beings*, should be substituted for the phrase: *the greatest number of people*. (FL)

**UTILITY:** The state of being useful or producing good. (DM)

**UTILITY PATENTS:** Usefulness or utility is one of the criteria used to evaluate patent applications. Utility patents are patents issued to inventors of any new and useful process, machine, manufacture, or composition or any new and useful improvement there of. (DM)

**UTOPIA:** (Greek: *ou* 'no' + *tópas* 'place') An omas More's '*Utopia*' (1516). Utopia is often interpreted as dreams of ideal perfection, implying 'good place' ( *eu*: 'good') instead of the more correct 'no-place' ( *ou*: 'no'), which created the category of dystopia ( *dys*: 'bad'). So the term 'utopia' also includes the subset of dystopias like Huxley's '*Brave New World*' and Orwell's '*Nineteen Eighty-Four*', as well as schemes somewhere in-between. Utopians have had to deal with fundamental problems of ethics, society and human interaction. Varying visions of ideal society have been proposed, dealing with human behavior towards one another and the elimination of desire, selfishness and wrongdoing. Utopias have been criticized on the basis of their social uniformity, and justification for unnatural proposed changes to human nature. In fact, and at the dystopian end of the spectrum, have been ideas of eugenic genocide (Hitler), selective extermination (Pol Pot), and authoritarian punishment (Lenin). Alternate proposals have included the middle way to self-enlightenment (Buddha), and in the fictional utopias altruism (Campanella), mood altering drugs (Huxley), the abolition of family (Plato) or of the legal system (Morris). Other bioethical dilemmas tackled by the utopian literature include justice, relation to nature, feminism, child-rearing, disability, abortion, euthanasia, sterilization, sexual promiscuity, and broader ethical debates such as good versus evil in human nature, reason versus passion, social welfare versus freedom, and collectivism versus individuality. Utopian visionary journeys have included those of Plato's '*Republic*' (c.360 bce ); Tommaso Campanella '*City of the Sun*' (1602); Francis Bacon '*New Atlantis*' (1627), Etienne Cabet '*Voyage to Icaria*' (1839); William Morris '*News from Nowhere*' (1891); H.G. Wells '*A Modern Utopia*' and '*Men Like Gods*', and Aldous Huxley's '*Island*' (1962). Perhaps the modern utopian writers are idealistic environmentalists and futurologists of popular science such as those investigating the revolutionary potential of genetics, nanotechnology and cyberia. (See DYSTOPIA, ESCHATOLOGY, FUTUROLOGY, SCIENCE FICTION, NANOTECHNOLOGY, OMEGA POINT THEORY, PEACE, SUSTAINABILITY, HUXLEY, ALDOUS, MORE, THOMAS) (MP)



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<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**VACCINATION:** (Latin *vacca* 'cow'). Any inoculation of killed or attenuated disease-bearing microorganisms given to induce immunity to or reduce the adverse effects associated with that particular disease. Vaccination can be administered by injection (intramuscularly, subcutaneously or intradermally) or by oral dosing. Vaccinating children against such diseases as measles, whooping cough, diphtheria and polio has been made compulsory in a number of countries. However, some oppose compulsory vaccination programs because, like any inoculation, it may infrequently cause infection and even more infrequently induce severe allergic reactions. (See VACCINE, IMMUNITY, IMMUNE SYSTEM, JENNER, EDWARD). (IP)

**VACCINE :** (Latin *vaccinus* 'relating to the cow'). A preparation containing killed or attenuated disease-bearing microorganisms used to induce immunity to that particular disease. Vaccines may be used as single or combination preparations. (See VACCINATION, IMMUNITY, IMMUNE SYSTEM, JENNER, EDWARD). (IP)

**VALIDATION:** The process of assessing the validity of a theory, argument or statistical result. This usually involves an independent check of the reported results, preferably including investigation of the same topic from a different angle. (See VALIDITY, KNOWLEDGE VALIDATION, SENSITIVITY ANALYSIS) (MP)

**VALIDITY:** Validity is a property of reasoning, arguments or logical inferences. Valid reasoning has coherence and agreement of its premises, which together logically imply the conclusion (whether or not any of these are actually true). In non-philosophical parlance, a valid argument must in addition not be a weak argument or include false statements. Validity can also be property of measurement and modeling, for example content, construct and criterion validity. (See COHERENCE, VALIDATION, VERIFICATION, VERACITY, PROOF) (MP)

**VALIUM :** See DIAZEPAM

**VALUE** 1. The worth of something/someone, can be monetary worth, aesthetic worth, ethical worth or worthy as a means in itself 2. of a thing as measured by the amount of other things for which it can be exchanged, or estimated in terms of a medium of exchange (from Old French *valeir* meaning worth). (IP)

In general it means the importance or worth, price put by humans on a species / natural resources / concept. Measured in terms of utility for humans, e.g. time spent on an item. Intrinsic value is the concept of independent existence, having a predetermined purpose of a species/organ, places an objective value on individual animal, species, ecosystem, biosphere. See the concept developed by Holmes Rolston III, for example. A hierarchy of values is giving different values in the order of importance of organisms/ecosystem. (JA)

**VARIABLE:** 1. Containing variety, fluctuating. 2. In statistics, a measurement or attribute, able to be graphed and analyzed. (See DIVERSITY, DEPENDENT VARIABLE, INDEPENDENT VARIABLE) (MP)

**VARIANCE:** A measure of dispersion, variance is equal to the standard deviation squared. (See STANDARD DEVIATION, MEASURES OF DISPERSION) (MP)

**VARIETY** refers to a distinct group of plant or animal within the same species that share a number of characteristics which are passed on from one generation to the next and which distinguishes the plant/animal of one variety from those of another. (IP)

**VASECTOMY:** Sterilization of a man by surgical excision of a part of the vas deferens. (DM)

**VDRL TEST :** Venereal Disease Research Laboratory Test, a microscopic agglutination screening test for the detection of Waisermann antibodies in the serum of syphilitic patients. (JA)

**VECTOR:** DNA molecule originating from a virus, a bacterium, or the cell of a higher organism used to carry additional DNA base pairs; vectors introduce foreign DNA into host cells, where it can be reproduced in large quantities. Examples are plasmids, cosmids and yeast artificial chromosomes. (DM)

**VEDAS:** (Sanskrit: 'knowledge'). Sacred literature of Hinduism, composed from around 1500 BCE and comprising the four Vedas: the 'Rig Veda' containing hymns of praise, the 'Sama Veda' with sacrificial chants, the 'Yajur Veda' with sacrificial formulae, and the 'Atharva Veda' comprised of spells and legends. The Vedas were appended with the 'Brahmanas', 'Aranyakas' and 'Upanishads', which were more philosophically inclined and highlighted non-sacrificial means to salvation. (See Upanishads ) (IP & MP)

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**VEDIC :** A period in Indian/Asian culture, dating back 3,500 BC to 800 BC. Features include personification of nature, ascribed divinity to natural resources like rivers, mountains, water, air, fire, land. (JA)

**VEGETARIANISM :** The custom of eating only vegetable products and no meat. Vast numbers of vegetarians, especially in India, also eat milk and milk products. In some parts of the world, notably Bengal, fish is accepted as part of a vegetarian diet. It can be debated whether eggs are acceptable. Reasons for vegetarianism may be (1) respect for the rights of animals, (2) health, (3) spirituality. The Brahmin caste in India is traditionally vegetarian. They are also known for a high standard of health.

Many people believe that eating meat is necessary for their health, while others successfully live long, healthy vegetarian lives. There might be a "gene for vegetarianism" in the sense that certain people, perhaps including the Brahmins, might have genetic sequences, which produce enzymes, or other substances, which allow them to get optimal nutrition from non-meat sources. But this hypothesis has not yet been adequately researched. Another hypothesis, which has not yet been adequately researched, proposes that younger, growing people need meat, while older people can do well on a vegetarian diet. (FL)

**VEGETATIVE PROPAGATION :** Includes to cut bits of mature plants that are grown to produce genetically identical plants, analogous to animal cloning. (JA)

**VEGETATIVE STATE** : A state in which a patient (usually through brain damage) is not brain dead, shows EEG activity, goes through periods of sleep and wakefulness, but cannot communicate with others and shows no evidence of consciousness. The "permanent vegetative state" must be distinguished from the "persistent vegetative state". Dr Keith Andrews of London has succeeded in returning patients to various levels of consciousness after four or more years in the persistent vegetative state. The Israeli hospital, Beit Levenstein, has had similar success with accident and terror victims. Raanan Gillon once argued in the *British Medical Journal* that in spite of Dr Andrews' success, the investment is not justified within a National Health Service whose resources are limited. But one may question what right we have to judge the meaning of people's lives, even if their level of consciousness and function seem to be low. The term, "vegetative" is unfortunate and insulting to patients, families and caregivers. Perhaps "persistent coma" would be a more successful term. (FL)

**VENTILATORS** : Mechanical devices used to produce or assist pulmonary ventilation. Also called respirators. (DM)

**VENUS** 1. in Roman mythology the Goddess of sexual love and desire with her kingdom consisting of those with strong passions who were embroiled in a multitude of love affairs and sometimes in a confused welter of problems (see Aphrodite) 2. The oldest known human statuettes are the fertility figurines or Venuses of the Paleolithic Age crafted around and before 22,000 BC 3. The planet orbiting next to earth nearer to the sun who is known as the brilliant Morning or Evening "Star"; her phases, discovered by Galileo and accessible to the simplest astronomical telescope, are spectacular so the planet has dazzled humankind since antiquity. The NASA Magellan probe, between 1990 and 1992, monitored two complete rotations of the planet and established an entire map with unequalled resolution. (IP)

**VENUS'S-FLYTRAP** : genus *Dionaea* are carnivorous, heterotrophic plants which augment their nitrogen and phosphorus supply by capturing and digesting flies and other insects. None of the carnivorous plants must feed on insects as they grow adequately without them, but in nature they grow faster and are a darker green when insects are available to them because the extra supply of nitrogen is used to make more proteins and chlorophyll, as well as other nitrogen-containing compounds. (IP)

**VERIFICATION**: 1. Management: Checking that the data being used are the same as those in the original source; a systematic search for errors. 2. Philosophy: The sometimes difficult process of showing a statement to be conclusively true. The 'Verification Principle' of Logical Positivism was the belief that meaningful propositions must be empirical and verifiable. (See REPLICATION, VALIDITY, VALIDATION, PROOF, FALSIFICATION, EMPIRICISM) (MP)

**VERTEBRATE** : The group or individual animals of the phylum Chordata, subphylum vertebrata. Vertebrates are characterized by the presence of a spine. (RW)

**VESTED INTERESTS**: See STAKEHOLDERS, PROFIT MOTIVE.

**VIABILITY**: The potential of the fetus to survive outside the uterus. (DM)

**VIABLE**: Alive - capable of replication like a cell or DNA in a cell. (JA)

**VIAGRA** : Trademark name for sildenafil citrate, an oral therapy for erectile dysfunction. Unlike previously approved treatments for impotency, Viagra does not directly cause penile erections; instead it affects the male's response to sexual stimulation. The drug acts by enhancing the smooth-muscle relaxant effects of nitric oxide; a chemical normally released in response to sexual stimulation. This smooth-muscle relaxation allows increased blood flow into certain areas of the penis, leading to an erection. It is important to note, however, that

impotency is often associated with other underlying disorders such as hypertension, diabetes, coronary artery disease and severe anxiety states. Therefore, Viagra cannot be seen as a panacea and is contraindicated in patients with known organic disorders, especially if undergoing other drug therapies. Viagra has not been studied in combination with other treatment regimes. (IP)

**VIROID:** One of the simplest examples of life or proto-life, a viroid is a short circle or coil of unprotected RNA. (See VIRUS) (MP)

**VIDEO CONFERENCING:** The gathering of executives or experts in an interactive audiovisual software environment on the internet. Desktop webcams deliver images of participants who can meet face-to-face in cyberspace without the inconvenience and expense of travel. Virtual reality technologies have the potential to revolutionize online education and acquaintance. (See CYBERSPACE, VIRTUAL REALITY) (MP).

**VIDEO GAME VIOLENCE:** The computer or video game is a traditionally violent medium, often training young users in hand-eye coordination tasks such as shooting, combat skills and other competitive activities. The "first-person shooter" action genre in particular (pioneered by *Doom* and *Quake* ) has taken violence to a new level. "Game over" is often heralded by the death of the protagonist, for example in the popular *Tomb Raider*, the gamer is in effect watching a girl undergoing a continuous series of different gory deaths. Such games may have a desensitizing effect on the often immaturely developed psyche of young gamers. This will be of greater concern in the era of virtual reality, where the distinctions between virtuality and reality will become increasingly indistinguishable. (See DESENSITIZATION, VIOLENT MEDIA, VIRTUAL REALITY) (MP)

**VIENNA, CIRCLE** A group of philosophers who flourished in Vienna during the 1920's and 1930's, until they had to flee Nazism. They attempted to rid scientific, as well as ordinary language from metaphysics, which they described as *nonsense*. Their famous principle said that a sentence is meaningful if, and only if, it is either analytic or empirically verifiable. By *analytic* is meant a sentence, which can be proved by the methods of logic or mathematics. Sentences, which do not meet this criterion, are considered to be nonsense. The movement may have been a reaction against much of the ideological verbiage in European nationalism, Fascism, and Nazism. But they may have reacted too extremely in that they also rejected all religious and ethical language. Statements of ethics were considered nonsensical in that they failed to describe any facts in the world, for after all *good* and *bad* do not describe empirically observable qualities like colours and sounds. But although statements of ethics have no scientific meaning, they may have an emotive meaning in that they serve to express feelings. (FL)

**VIETNAM WAR :** Beginning in 1959-1960 and lasting till 1975. It was a war between the northern (mostly communist government of Ho Chi Minh in Hanoi) and southern (anti-communist government of Ngo Dinh Diem in Saigon) zones of Vietnam as they emerged from the Geneva Agreement of 1954. The conflict was also a 'cold war' struggle between the United States and the Soviet Union. At the height of the war (1967-1968) there were 500,000 American troops in Vietnam. American air attacks on the north began in 1965 when they also began to send combat troops. American forces were withdrawn in 1973 and in 1975 South Vietnam fell under communist forces and Saigon was re-named Ho Chi Minh City. (See CONSCIENTIOUS OBJECTOR, AGENT ORANGE, INSTITUTION OF WAR). (IP)

**VIOLENT MEDIA:** The debate has been long-lived as to the effects of violent movies, television and video games on society and individuals. Conflict has been considered essential to successful drama, and violence is common currency in the media of many countries. Violence may be central to comedy as well as drama, as the typical misfortunes of someone in a slapstick or cartoon fantasy would testify. Context, tone and intent of a work make the difference between a war movie and an anti-war movie. A violent movie can still promote an

ethical value system, illustrate significant issues, or even act as a relatively safe outlet for aggressive tension. However, gratuitous violence or vengeance without proper illustration of negative consequences may glorify non-ethical social values and standards, and may lead to desensitization or even imitation in some unstable or immature personalities. In such individuals fight moves and other aggressive acts may be added to the repertoire – an extreme example perhaps being the extraordinary plot leading to September 11, 2001. Media has a large role in injecting ideas into the infosphere and shaping public c required of factors perpetuating violent media, such as the psychological reasons behind consumer demand for such media, or the mutualistic relationships between News oredia makers are admired by consumers and critics when they promote human values and produce positive, balanced news and entertainment. (See VIDEO GAME VIOLENCE, TELEVISION, DESENSITIZATION) (MP)

**VIRTUAL REALITY:** (Virtual "essence or appearance of" + Reality "existing environment"). A computer generated environment, simulating and resembling actual reality or constructing an imaginary artificial world. The virtual reality environment is interactive with the virtual traveller through equipment such as electronic gloves to monitor hand movements and a helmet with TV displays to each eye. This results in the illusion of entering and interacting within a constructed or simulated reality. An interesting example would be to enter the visual field of a robot and watch yourself. The technology has many applications including remote surgery, space/deep sea exploration, unmanned military units, skills training, cyberspace conferencing and other tasks involving interaction in three-dimensions with computer technology. Not least among these applications is the entertainment industry, where potential ripples to the psychosocial fabric include tactile simulated sex at a distance (teledildonics), highly addictive psychedelic playgrounds, and desensitization to reality from the regular exposures of military trainees and young virtual reality gamers. (See VIRTUAL WARFARE, CYBERSEX, DESENSITIZATION) (MP)

**VIRTUAL WARFARE:** Armed conflict linked with electronic and computer technologies - virtual warfare is actual warfare, but waged at a distance with virtual reality, for example tele-operated gun vehicles. Cyber-warfare involves different types of activities, and autonomous weapons differ in their independent ability to locate and direct themselves unaided. In casualty-averse modern warfare the unmanned aerial vehicle (UAV) is becoming increasingly standard, able to perform live reconnaissance (e.g. 'Global Hawk' surveillance aircraft) and offensive missions (e.g. 'Predator' drone) pilotedwarm intrusion, biological weapons. (See VIRTUAL REALITY, CYBERWARFARE, AUTONOMOUS WEAPONS, SPACE WARFARE, ROBOT, MOTE, NANOBOT, BIOLOGICAL WARFARE, INSTITUTION OF WAR, NON-LETHAL WEAPONS) (MP & IP)

**VIRTUES :** Character traits which are considered to be morally praiseworthy, such as compassion, honesty, integrity, and trustworthiness. (DM)

**VIRULENCE :** The degree of pathogenicity exhibited by a strain of microorganism. (JA)

**VIRUS :** (Latin: 'slime' or 'poison') Any of a large group of sub-microscopic organisms comprised of a protein coat with genetic material in the form of a nucleic acid molecule (DNA or RNA, double or single strand, linear or circular). A virus is however unable to reproduce outside the host cell of another plant or animal, and for this reason is often not included within the definition of life. Viruses nevertheless live at the borderlines, providing insight into the nature and processes of life and evolution. Some viruses are pathogenic to plants and animals, for



example causing human diseases including the common cold, herpes, measles, smallpox and HIV/AIDS. (See VIROID, BACTERIA, LIFE, COMPUTER VIRUS) (MP)

**VISION** : (Latin *visus* 'vision') 1. Exceptional strategic perception and foresight, a characteristic of effective leadership. The visionary leader's concepts may appear idealistic or unrealistic, but vision is based on a higher order of perception concerned with fundamental insights, the big picture, and projection of current concerns into the future. (See **FORESIGHT, VISIONARY COMPANY**) (MP) 2. The sense of sight. The eye is the organ that provides vision, situated in the orbital cavity and supplied by the optic nerve or second cranial nerve. Structurally the two eyes are separate but, unlike the ear, some of their activities are coordinated so that they function as a pair; for example, it is possible to see with one eye but three-dimensional vision is impaired when only one eye is used. Light waves, which travel at a speed of 300,000 km per second, are reflected into the eyes by objects within the field of vision. Light is a combination of all colors of the visual (rainbow) spectrum; that is, red, yellow, green, blue, indigo and violet. The spectrum of light is broad but only a small part is visible to the human eye. Beyond the long end there are infrared (heat), radar and radio waves; beyond the short end are ultraviolet (uv), x-ray and cosmic waves. Other animals can see differing spectra; for example the honeybee can see uv light - an evolutionary adaptation to its way of life. A specific color is perceived when one wavelength is reflected by an object and all others are absorbed; for example, an object appears red when only red wavelength is reflected, white when all wavelengths are reflected and black when they are all absorbed. The light reflected from objects within the visual field is focused on the retinas of both eyes. Before reaching the retina light rays pass successively through the conjunctiva, cornea, aqueous fluid, lens and vitreous body - all are denser than air and with the exception of the lens they have a constant refractive power close to that of water. It is the elastic structure of the lens which changes the refraction, bending all the light rays in order to focus them onto the retina (light from distant objects needs least refraction and as an object comes closer the amount required increases). Looking at near objects tires the eyes more quickly due to the continuous use of the ciliary muscle suspending the lens - adding credit to precautionary advice about close work, especially at computer terminals. The retina is the photosensitive part of the eye, with the light-sensitive cells called the rods and cones. Light rays cause chemical changes in photosensitive pigments in these cells, which emit nerve impulses that pass to the visual lobes of the cerebrum via the optic nerves. It is in the brain where perception of different colors takes place. The eye is a delicate organ which is protected by several structures such as eyebrows, eyelids, eyelashes and lacrimal (tear) glands. (See **SENSES, BATES WILLIAM**) (IP)

**VISIONARY COMPANY** : Corporations or organizations which are the premier institutions of their industries, have long-term success and make a significant impact on the world. The distinguishing feature of visionary companies is that they are driven not by profits but by vision - they have clear core values and meaningful objectives which manage to inspire staff, stakeholders and society. (See **SUSTAINABLE CORPORATION, ENVIRONMENTAL CODE OF CONDUCT, STEWARDSHIP**). (MP)

**VITALISM** the view that a patient's life is self-determining, therefore, it is a doctor's duty to sustain life even if it were decided that the patient were better off dead.

**VITAMIN** : (Latin *vita* "life"). Any one of several unrelated organic compounds that an organism cannot synthesize itself so they must be obtained from the diet, or from dietary supplements. They are essential, in small quantity, for normal growth and metabolism and when deficient produce specific-deficiency illnesses. Vitamin loss occurs as a result of handling and preparation of fresh foods during harvesting, heating, pickling, salting, drying, milling, canning and other food-processing methods. Vitamin loss can also be associated with digestive disorders that prevent nutrient absorption and with the use of certain drugs. (See **NUTRITION, VITAMIN A, VITAMIN B complex**,



VITAMIN B, VITAMIN C, VITAMIN D, VITAMIN E, VITAMIN K, NIACIN, MINERALS, MINERAL AND VITAMIN DEFICIENCY). (IP)

**VITAMIN A** : This vitamin is not found in plants but is synthesized by the animal body from various pigment substances or carotenoids that are common in plants; for example, carrots and apricots advertise their  $\beta$ -carotene content by their yellow/orange color or tomatoes and red peppers by their lycopene which makes for a deeper orange/red color; but green leafy vegetables such as parsley and spinach are also a rich source of these vital pigments. Animal products such as fish liver oils, liver, milk, cheese, butter and egg yolk are a rich source of vitamin A. Vitamin A is essential for night vision, promotes healthy skin and mucous membranes and is important for skeletal growth and good teeth, for effective digestion, for production of red and white blood corpuscles in the blood, and for lactation (breast feeding). Vitamin A is fat-soluble and is sensitive to oxygen especially if combined with heat. (See NUTRITION, VITAMIN, VITAMIN B complex, VITAMIN B, VITAMIN C, VITAMIN D, VITAMIN E, VITAMIN K, NIACIN, MINERALS, MINERAL AND VITAMIN DEFICIENCY). (IP)

**VITAMIN B** : 1. Vitamin B<sub>1</sub> or thiamine (Greek *theion* "containing sulfur" + *amine* "ammonia") occurs in both plant and animal tissue and plays a key role in the body's production of energy through the breakdown of carbohydrates and also takes part in systems. Since the vitamin is not stored in the body it must be supplied daily. Vitamin B<sub>1</sub> is found in good quantity in brewer's yeast, sunflower seeds, wheat germine deficiency disease. 2. Vitamin B<sub>2</sub> or riboflavin (Latin *ribose* "a 5-carbon sugar" + *flavus* "yellow") occurs generally in the same foods as vitamin B<sub>1</sub>. Riboflavin is essential for cell growth and for enzymic reactions by which the body oxidizes proteins, fats and carbohydrates. Vitamin B<sub>2</sub> plays an important part in preventing visual disorders especially cataracts. Most plants contain traces of vitamin B<sub>2</sub> but in good quantity can be found in brewer's yeast, dried almonds, wheat germ, unpolished rice, barley, sweet potatoes. Animal sources are organ meats, milk, cheese and eggs. 3. Vitamin B<sub>6</sub> or pyridoxine occurs in small quantities in most plant and animal tissue but rich sources are meat especially organ meats, yeast, blackstrap molasses, wheat bran and wheat germ, soybeans, barley, rice, peanuts, cabbage, potatoes and carrots. Vitamin B<sub>6</sub> takes part in many enzyme reactions and is particularly important for construction of hormones important in brain function, the production of antibodies, the maintenance of the body's fluid balance and the effective absorption of vitamin B<sub>12</sub>. There is an increased need for pyridoxine during pregnancy, breast-feeding and use of oral contraceptives. 4. Vitamin B<sub>12</sub> or cyanocobalamin (Greek *kyanos* "blue" + German *kobald* "mine goblin"). There is little or no vitamin B<sub>12</sub> in plants which is why a strictly vegetarian diet sometimes causes pernicious anemia and risk brain damage. Rich dietary sources are liver, kidney, meats, fish and dairy products. Vitamin B<sub>12</sub> is essential for the proper functioning of body cells particularly in the nervous system, bone marrow and the gastrointestinal tract. The vitamin is also involved in the metabolism of fats, proteins and carbohydrates. (See NUTRITION, VITAMIN, VITAMIN B complex, VITAMIN A, VITAMIN C, VITAMIN D, VITAMIN E, VITAMIN K, NIACIN, MINERALS, MINERAL AND VITAMIN DEFICIENCY). (IP)

**VITAMIN B COMPLEX** : A group of water-soluble vitamins possessing individual structures and biological effects that is defined separately under vitamin B (B<sub>1</sub> through to B<sub>12</sub>). They are present separately or in combination in many foods - especially liver and yeast - and are heat sensitive risking destruction by prolonged cooking. (See FOLIC ACID, VITAMIN B). (IP)

**VITAMIN B<sub>9</sub>** : See FOLIC ACID

**VITAMIN C** : Also called ascorbic acid. (Greek *a* "not" + *scurf* "scurvy"). This vitamin is a plant vitamin and occurs to some degree in almost

all plants. The human body neither makes or stores vitamin C, thus a continuous supply must be provided in the food. Normal body cell function requires ascorbic acid, as does the formation of intercellular matrices, healthy collagen (the basic protein of connective tissue), bones, teeth, cartilage, skin and capillary walls. Vitamin C promotes the body's effective use of other nutrients and by enhancing the function of and other forms of drug abuse all increase the body's need for vitamin C, as does distress such as chronic anxiety and depression. The body's need for vitamin C is also elevated during pregnancy and lactation. Scurvy is a vitamin deficiency. Plentiful in rose hips, tomatoes, parsley, winter cress, green pepper, broccoli, citrus fruits. (See NUTRITION, VITAMIN, VITAMIN B complex, VITAMIN A, VITAMIN B, VITAMIN C, VITAMIN D, VITAMIN E, VITAMIN K, NIACIN, MINERALS, MINERAL AND VITAMIN DEFICIENCY). (IP)

**VITAMIN D** : This vitamin, chemically related to steroids, does not occur in plants but some plants contain compounds called sterols (a form of cholesterol) which can be irradiated with ultraviolet light to make Vitamin D. Yeast and fungi, for example, are rich sources of ergosterol that can be irradiated to make commercial vitamin D. The human skin contains another sterol, which is converted to vitamin D by the ultraviolet part of sunlight that is then absorbed; however, this sterol can be removed by using soap whose alkalinity removes the oil from the skin. Natural sources are fish liver oil, salt-water fish especially sardines and herring, organ meats, milk and egg yolk but requirements can also be met by artificial enrichment of various foods. Vitamin D is essential for healthy bones and teeth, for proper assimilation and body balance of calcium and phosphorus, and for the prevention of rickets. The vitamin is fat-soluble and is not sensitive to heat, light or oxygen. (See NUTRITION, VITAMIN, VITAMIN B complex, VITAMIN A, VITAMIN B, VITAMIN C, VITAMIN D, VITAMIN E, VITAMIN K, NIACIN, MINERALS, MINERAL AND VITAMIN DEFICIENCY). (IP)

**VITAMIN DEFICIENCY** : See MINERAL AND VITAMIN DEFICIENCY

**VITAMIN E** : Also called tocopherol. This vitamin occurs in both plant and animal tissue. As an intracellular antioxidant it acts in the body to protect polyunsaturated fatty acids and other fatlike substances such as vitamin A and hormones of the pituitary, adrenal and reproductive glands from oxidation damage. The vitamin also maintains healthy membrane tissue, blood cells and is essential for fertility. It is generally found in whole grains and their oils, green leaves and seeds, thus is in abundance in sunflower oil, cotton seed oil, wheat germ oil and wheat germ, peanuts, olive oil, oatmeal and so on. Since the vitamin is stored in the body for a long time it is also found in butter, liver and eggs. Vitamin E is fat-soluble and is sensitive to oxygen, alkalis and ultraviolet light. (See NUTRITION, VITAMIN, VITAMIN B complex, VITAMIN A, VITAMIN B, VITAMIN C, VITAMIN D, VITAMIN E, VITAMIN K, NIACIN, MINERALS, MINERAL AND VITAMIN DEFICIENCY). (IP)

**VITAMIN K** : Occurs primarily in plants but is also synthesized by intestinal bacteria in the small intestine. Vitamin K belongs to a group of compounds known as quinones that are essential for the synthesis by the liver of the blood-clotting enzyme prothrombin. The vitamin is fat-soluble and is sensitive to light, oxygen, strong acids and alkalis. It is found in abundance in alfalfa, green leafy vegetable, soybean oil, kelp, fish-liver oils, blackstrap molasses, liver, yogurt and egg yolk. Deficiency, which can be associated with intestinal or liver disease, is characterized by poor blood coagulation and hemorrhage. Sometimes the vitamin is given prophylactically to infants to prevent hemorrhagic disease. (See NUTRITION, VITAMIN, VITAMIN B complex, VITAMIN A, VITAMIN B, VITAMIN C, VITAMIN D, VITAMIN E, NIACIN, MINERALS, MINERAL AND VITAMIN DEFICIENCY). (IP)

**VNTR (Variable Number of Tandem Repeats)** : Short repeated sequence of 11-16bp: GGAGGTGGGCAGGA[A/G]G. The presence of core sequences favors the high unequal recombination rate (10 fold, compare, accounting therefore for its high polymorphism and usefulness

in linkage or forensic analyses. (GK)

**VOICE RECOGNITION:** See SPEECH RECOGNITION.

**VOLUNTARY ADMISSION :** Entrance into a mental health facility at a person's request or with his or her consent. (DM)

**VOLUNTARY EUTHANASIA :** The killing of a patient who is suffering or is afflicted with an incurable disease or condition, for reasons of mercy, at that person's request or with his or her consent. (DM)

**VOLUNTARY SIMPLICITY:** See HIPPIES and SUFFICIENCY.

**VOLUNTARY STERILIZATION :** Sterilization performed at the request of, or with the informed consent of, the patient. (DM)

**VOLUNTARY ADMISSION :** Entrance into a mental health facility at a person's request or with his or her consent. (DM)

**VOLUNTARY SIMPLICITY:** (See SUFFICIENCY, HIPPIES)

**VULNERABLE SPECIES:** A species or other taxon which is at high risk of becoming extinct in the wild in the medium-term future. This may be indicated by any of the following measures: a) a previous or projected population reduction of at least 20% over whichever is longer of a period of 10 years or three generations, b) extent of occurrence less than 20,000 km<sup>2</sup> or area of occupancy less than 2000 km<sup>2</sup>, along with population decline, fragmentation or extreme fluctuations, c) population less than 10,000 mature individuals with continuing decline, d) population less than 1000 mature individuals, or e) probability of extinction in the wild at least 10% within 100 years. (See ENDANGERED SPECIES, CRITICALLY ENDANGERED, GHOST SPECIES, EXTINCTION) (MP)

## W

<a href="#">A</a>	<a href="#">B</a>	<a href="#">C</a>	<a href="#">D</a>	<a href="#">E</a>	<a href="#">F</a>	<a href="#">G</a>	<a href="#">H</a>	<a href="#">I</a>	<a href="#">J</a>	<a href="#">K</a>	<a href="#">L</a>	<a href="#">M</a>	<a href="#">N</a>	<a href="#">O</a>	<a href="#">P</a>	<a href="#">Q</a>	<a href="#">R</a>	<a href="#">S</a>	<a href="#">T</a>	<a href="#">U</a>	<a href="#">V</a>	<a href="#">W</a>	<a href="#">X</a>	<a href="#">Y</a>	<a href="#">Z</a>
<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**WAR :** See INSTITUTION OF WAR.

**WAR CRIMINAL :** An officer who was responsible for cruel acts, while he was serving in the army which lost the war.(FL)

**WASTE:** Gratuitous use and squander of resources by the human species, a result of unnecessary products, unused by-products, excess packaging, overzealous advertising, inbuilt redundancy, conspicuous consumption and a preoccupation with economic growth. Consumption

of resources by humans causes damaging flows of waste back into the environment, including landfill rubbish, industrial pollutants and sewage. (See CONSUMPTION, CONSPICUOUS CONSUMPTION, INBUILT REDUNDANCY, RECYCLING, ECONOMY) (MP)

**WATER CRISIS** : A state of emergency in which populations are at risk of death, disease and panic due to an interruption/contamination of the fresh water supply. Many communities of the world endure an unclean, unpredictable and remote water source on a daily basis. The term also refers to times of drought and insufficient water supply to agricultural and ecological systems. (See WATER POLLUTION, WATER PURIFICATION, WATER CYCLE) (MP)

**WATER CYCLE**: The movement of water from the oceans to the atmosphere by solar evaporation, to the soil by precipitation, and back to the oceans via runoff from rivers and groundwater. Some water is cycled many times within compartments of the system before completing one full circuit. Terrestrial ecologies including humans are dependent upon sustainable management of the fresh water phase of this cycle. (MP)

**WATER PURIFICATION** : Clean, clear water is an essential requirement of the healthy body. Fresh water may be purified by filtration processes (e.g. sand/charcoal filtering particulate matter), adsorption (e.g. activated carbon for non-biodegradable organic compounds), precipitation (reduces water 'hardness'), reverse osmosis (semi-permeable membranes separated by ionic pressure differentials), electrodialysis (electric filtration), distillation (multistage flash distillation, vapor compression, desalinization plants), freezing (freezing-vapor compression), boiling (microorganism sterilization) and other chemical processes such as sedimentation, ion exchange, coagulation, flocculation, solvent extraction, hydrate formation, aeration, chlorination and fluoridation. (See DESALINATION, WATER CRISIS, WATER POLLUTION) (MP)

**WATSON, JAMES DEWEY** : 1928 - Together with Francis Crick, the discoverer in 1953 of the double stranded helical structure of deoxyribonucleic acid (DNA), the molecule that carries hereditary information in living things. Winner of the 1962 Nobel Prize in Physiology or Medicine together with Crick and Maurice Hugh Frederick Wilkins. President of the Cold Spring Harbor Laboratory, a leading molecular biology research and education institution ([www.cshl.org](http://www.cshl.org)). (RW)

**WAVE POWER** : Electricity generated from energy produced by the action of coastal waves. Wave power often uses the vertical oscillations of floating devices to spin generators, dependent upon wind, current and underwater topography. Wave energy has proven a technological and economic challenge and as yet contributes little to the world's energy supply. (See OCEAN POWER, TIDAL ENERGY, RENEWABLE ENERGY) (MP)

**WCED**: World Commission on Environment and Development

**WEAK SUSTAINABILITY**: "Weak" (or "broad") sustainability requires the passing on to the next generation of an aggregate stock equivalent to that of today ("constant capital") but is indifferent to the form in which it is passed on. Unlike "strong" sustainability, in this scheme the environment is treated as simply another capital stock, with the generous assumption that natural assets are substitutable and can be replaced by human infrastructure. A better argument may be that human wealth should be compensated for by environmental regeneration. Even for weak sustainability, the use of non-renewable resources must generate investment in alternatives, and critical natural capital cannot be substituted. (See STRONG SUSTAINABILITY, CRITICAL NATURAL CAPITAL, CONSTANT CAPITAL) (MP)

**WEALTH** : Wealth refers to accumulated ownership, whether of money, property, knowledge, happiness or any other collectable faculty. Wealth is unevenly distributed between individuals and countries, with a tendency to flow towards existing wealth rather than distributing evenly. Excessive accumulation of material wealth not distributed back into the community will indirectly rob the poorest of their wellbeing.

Countries have three major forms of wealth; material/economic wealth, human/cultural wealth and natural/biological wealth. (See WELLBEING, POVERTY) (MP)

**WEAPONS OF MASS DESTRUCTION:** Internationally maligned groups of horrendous weapons subject to international law through various global bans and non-proliferation treaties, WMD include nuclear weapons (e.g. atomic, hydrogen and neutron bombs), chemical weapons (e.g. mustard gas, vx nerve agent, sarin) and biological weapons (e.g. anthrax, smallpox, botulinum toxin). Concern must be expressed against the blurring of the boundaries of weapons of mass destruction, such as current discussion about low-impact nuclear weapons and gamma ray bombs. Similarly, future technological developments have equal potential for mass destruction, with potential impacts on the scale of the Earth or larger (including space weapons, genetically engineered bioweapons, nanotechnology and robotics). Examples of conventions against WMD include the Geneva Conventions and Protocols, Hague Conventions, Strategic Arms Limitation Talks (SALT I and II), Strategic Arms Reduction Treaties (START I and II), Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous and Other Gases and of Bacteriological Methods of Warfare (1925), Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (1993), Nuclear Non-Proliferation Treaty (1995), Comprehensive Nuclear Test Ban Treaty (1996) and Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction (1997). (See NUCLEAR WEAPONS, BIOLOGICAL WARFARE, CHEMICAL WARFARE, SPACE WEAPONS, AUTONOMOUS WEAPONS, NANOTECHNOLOGY WEAPONS, CONVENTIONAL WEAPONS, NON LETHAL WEAPONS, DISARMAMENT, DEMILITARIZATION) (MP)

**WEB:** 1. A network of interconnecting nodes which can transmit energy and materials (e.g. 'food web'). 2. Spider's silken net used for prey capture. 3. The internet's World Wide Web. (See WORLD WIDE WEB, FOOD WEB) (MP)

**WEB ADDRESS:** The internet is accessed through an Internet Services Provider (ISP). Sources are differentiated according to their 'web address' and accessed by clicking on 'hypertext' links. Hyper-Text Markup Language (html) is the Internet-based computer language used to create the World Wide Web document and address system. Hyper-Text Transfer Protocol (http) is used to deliver an address called URL (Uniform Resource Locator). A collection of documents for browsing is the 'web site' and a single document is a 'web page'. An individual person's letterbox is their 'e-mail' address. (See CYBERSPACE, WORLD WIDE WEB, EMAIL) (MP)

**WEB BROWSER:** The World Wide Web is searched and sifted through the platform of a 'Web browser' (e.g. Netscape Navigator, Microsoft Explorer), 'Web Search Directory' (Yahoo, About.com, Infoseek, Britannica), 'Search-engine' (Google, AltaVista), 'Web Metasearch Agent' (Internet Sleuth, Metacrawler) and/or commercial 'Web Portal' (e.g. Microsoft's msn). A directory implies human assembly and design, while an engine implies an automated process, each with their benefits and limitations. (See WEB ADDRESS, OPERATING SYSTEM, INTERNET) (MP)

**WEDGE ARGUMENT :** Ethical argument which asserts that one morally questionable action or policy will set a precedent for, or lead to, other actions or policies which are even more morally questionable. (DM)

**WEED:** Unwanted plant. For most of our agricultural history, farmers have tried to prevent weeds from growing. In many parts of the world, weeds still devastate many crops. However, in countries that use large amounts of herbicides and other products of BIOTECHNOLOGY (q.v.), weeds are now much scarcer than they used to be. This scarcity decreases the BIODIVERSITY (q.v.) of organisms on FARMS (q.v.). For example, birds that feed on weed seeds become rarer. Because of this, increasing numbers of people are questioning whether weed eradication should be our aim. (MR)

**WELLBEING:** (Anglo-Saxon: *wyllan* + *beon* 'to be') a good existence as defined by the individual. Researchers, since the early 1950s, have identified key factors in the generation and maintenance of physical, psychological and social wellbeing - the most notable being that a sense of control over our lives promotes wellbeing more powerfully than an appropriate command over behaviors such as smoking, diet and exercise. Since wellbeing can be improved by self-sustaining behavior, advanced by heightened personal empowerment, it is a pity that personal mastery which becomes a top priority in sickness, diminishes in the maintenance of the continuum of wellness. Modern ethical principles in medicine; such as, unconstrained informed patient consent, respect for patient confidentiality, frankness about medical uncertainties and justice, promote wellbeing as they reflect responsible patient control over their own health. Contrary to popular belief, acute stress is an essential function which protects our bodies against demanding life events and can actually boost wellbeing, as it increases arousal and attention. Acute stress also enhances our immunity. Chronic stress, whether physical or psychological, depresses our immune system function through an over-production of the stress hormones (see ALLOSTASIS, STRESS, LEARNED HELPLESSNESS, HEALTH AND GENUINE PROGRESS INDICATOR). (IP)

**WEST:** A term derived from the hemisphere of Eurasia in which it originated, "The West" refers to the civilization which evolved from the Classical legacy in Europe originally founded upon Greek and Roman philosophy, law and politics. Western civilization's historical influences include the Renaissance, nt. Western Christendom, later divided into Catho Orthodox Christians are increasingly included as strong indigenous component and relative poverty.CCIDENT) (MP)

**WESTERN DECLINE:** The West is the richest civilization, with massive military capability and domination of the international finance system, weapons industries and international communications. Commentators such as Samuel Huntington have however prophesized gradual or punctuated erosion of Western power. This decline may be due to global demographic shifts (i.e. a non-Western youth bulge with a "graying" West), global indigenization (e.g. the "democracy paradox" in which newly-formed democracies vote for non-Western tradition), the anti-capitalism movement, postmodern cultural confusion (e.g. antisocial behavior, apathy, weak work ethic, family breakdown, religious decline), and perhaps also a little international resentment for what is sometimes perceived as Western arrogance, decadence or economic imperialism. (See INDIGENIZATION, CLASH OF CIVILIZATIONS, COLONIALISM, POSTMODERNISM, DECADENCE) (MP)

**WESTERN PHILOSOPHY:** Western civilization comes from the Christian faith, divided since the Reformation into Catholic and Protestant, and today with large agnostic and mixed religious groups. Western philosophy has a distinguished lineage, including the fields of metaphysics (e.g. Plato, Aquinas, Leibniz, Hegel, Nietzsche, Heidegger, Nagel), ethics (Aristotle, Christ, Spinoza, Mill, Rawls), politics (More, Hobbes, Rousseau), economics (Smith, Marx, Keynes, Schumpeter), consciousness (Descartes, Sartre), psychology (Freud, Jung, Laing), science (Bacon, Popper, Kuhn, Einstein, Heisenberg), language (Chomsky, Derrida), logic (Kant, Russell) and knowledge (Locke, Berkeley, Hume, Foucault). Western society is today characterized by separation of church from state a release of politics which contributed to its social pluralism and individualism. Western individualism (concentrating more on rights, e.g. freedoms, equality, human rights) may contrast

somewhat with the collectivism of many other civilizations (based more on responsibilities, e.g. to family, state or God). Clearly a blend of the two is essential to ethics and sustainability (individual rights and wellbeing balanced by social and environmental responsibilities). Western philosophy embraces liberty, the rule of law, constitutionalism, gender equality, cultural diversity, representative institutions, private property, capitalism, strong aristocracy, modern science and technology, sustainable development, ethics, human rights, democracy, and if indigenous and youth cultures are included, multiculturalism and environmentalism. (See EASTERN PHILOSOPHIES) (MP)

**WESTERNIZATION:** The process of a country's culture becoming more lacted by the affirmation of culture called indigenization. Westernization is a different process from modernization. (See MODERNIZATION, INDIGENIZATION, WESTERN CIVILIZATION) (MP)  
**WFP:** World Food Programme.

**WHALES:** Cetaceans along with DOLPHINS (q.v.). In all, 39 species in 17 genera. Sea mammals including the largest animal (the female blue whale) even known on the Earth. Whale numbers have been drastically reduced by over-hunting in the nineteenth and twentieth century. Today, many traditional whaling countries no longer hunt whales but some species are still in serious decline due to deaths from collisions with ships. (See WHALING). (MR)

**WHALING:** because of man's greed whale s regulate a stable whaling industry but its record has been poor. A good example is the Australian humpback whale fishery which became uneconomic by 1963 because of overfishing off the continent's east and west coasts - not only because of the large number taken by Australian land stations, but also because whales from the same stocks were also taken off their Antarctic feeding grounds. lations showed that greater than 300-400 animals off each coast each year was unsustainable, yet catches of over 1,000 animals from one stock were consistently taken each year. However, through ements in scientific knowledge, more agreement among whaling nations, the appointment of international observers and the protection of many species, the IWC has indicated its willingness to reguccording to the principles of sustained management. Much emotional stress has been generated over the argument whether whaling should continue or not. One opinion is that under no circumstances such intelligent, highly evolved mammals be killed for commerce. The contrary view is that stocks that can withstand fishing should be harvested on a scientifically controlled basis. The ethicaeconomic views are often voiced together, so that confusion occurs, particularly when the ethical argument is used as justification for the IWC to regulate against whaling. A decision should firmade as to whether whales should be killed at all; if the answer is yes, then their killing must be regulated, and the whaling commission is currently the only international body capable of suchation (see SUSTAINABLE MANAGEMENT & WHALES). (IP)

**WHORE:** See PROSTITUTE.

**WIK CASE:** see MABO EDY.

**WILDERNESS:** A large remote area such as old-growth forest in which genetic diversity and natural cycles remain essentially intact and uninterrupted. More than National Parks, wilderness areas should have public access restricted to help preserve these designated examples of undisturbed ecological systems. (See NATURAL HERITAGE) (MP)

**WILDLIFE:** Often interpreted colloquially to mean natural animals, wildlife more correctly means the collective non-domesticated animals and plants of any habitat. (See WILDLIFE CORRIDORS) (MP)

**WILDLIFE CORRIDORS:** Wide strips of vegetation retained as linkages between isolated patches of forest habitat. Wildlife corridors are

essential to increase migration and foraging routes and allow genetic exchange, helping alleviate the biodiversity impacts of habitat fragmentation. Wildlife corridors also provide aesthetic values to intervening suburban landscapes. (See HABITAT FRAGMENTATION) (MP)

**WILD-TYPE:** An organism isolated from nature.

**WILSON, EDWARD O.** Coined the term "sociobiology". Author. *Biophilia* (Cambridge: Harvard University Press 1984). *On Human Nature* (Harvard University Press 1987).

**WILSON, JAMES Q.** Author *The Moral Sense* (Harvard University Press 1985).

**WIND ENERGY:** Wind power uses the force of the wind to drive energy-producing turbines that are based on the designs of traditional windmills. Windmills can be used to either generate electricity or do mechanical work. (See RENEWABLE ENERGY) (MP)

**WIPO:** World Intellectual Property Organization.

**WMA:** WORLD MEDICAL ASSOCIATION.

**WMD:** See WEAPONS OF MASS DESTRUCTION.

**WOMB** see UTERUS.

**WOMEN's BUSINESS** Australian Aboriginal concept in regard to female cultural life, or to secrets of female initiates only. The first initiation is a ceremony which marks the beginning of life as an adult and establishes a young woman's responsibility relating to childbirth, food cycles and ways to increase the Earth's food and shelter resources. The initiates are marked by a permanent sign on the body to demonstrate that they are now responsible adults. As for "men's business" women's business can be regarded as the Aboriginal equivalent of Latin provisions *Mens legis* - the mind of the law; that is, the purpose, spirit, or intention of a law or the law generally, and *Mens legislatoris* - the intention of the law-maker. (See MEN's BUSINESS, TOTEMISM). (IP)

**WOMEN'S LIBERATION MOVEMENT :** See FEMINISM.

**WORK:** 1. Employment and weekly occupation, work should be fulfilling, pleasurable and sustainable. (See WORKAHOLIC) 2. Physics: Work is force multiplied by distance ( $W=Fs$ ), a measure of change of energy. For example, work, measured in the Newton meter or Joule, is done with transfer from electrical to kinetic energy. (See ENERGY, EMPLOYMENT, HUMAN RESOURCES) (MP)

**WORKAHOLIC:** A person who is addicted to work, often working obsessively or seemingly constantly. Warning signs suggested by Workaholics Anonymous include working more than 40 hours per week, missing or taking work on vacations or weekends, and talking or thinking about work more than any other subject. The workaholic suffers physical and psychological stress as well as strain on family and social life. (See KAROSHI, WORKAHOLISM) (MP)

**WORKAHOLISM:** A modern affliction referring to the increasing pressure on workers to perform, such that work becomes the overriding



drive controlling a person's life. Today's modern techwireless technologies such as mobile phones have allowed work to intrude into our lives 24 hours and 7 days. (See KAROSHI, WORKAHOLIC) (MP)

**WORLD BANK:** The World Bank Group is the UN's 'International Bank for Reconstruction and Development', and its affiliates the 'International Development Association', 'International Finance Corporation' and 'Multilateral Investment Guarantee Agency'.

**WORLD HERITAGE:** The World Heritage List is an internationally recognized register coordinated by UNESCO for the protection of natural and cultural heritage. World Heritage status is conveyed upon architecture, landscapes, habitats, geological or historical monuments of outstanding universal value. For example, World Heritage natural sites include the Great Barrier Reef, cultural sites include Angkor Wat, and Australia's KakaTURAL HERITAGE, CULTURAL HERITAGE) (MP)

**WORLD VIEW:** One's 'world-view' ( *Weltanschauung* ) is an epistemological framework or paradigm which explains the world/universe and one's place in it. For example, outlooks on the structure of reality have sometimes followed Darwin), a web (Fritjof Capra), a hologram (Karl Pribram), a cell (James Lovelock), a computer (Alan Turing), or a matrix of overlapping 'windows' (Bill Gates). (See PARADIGM, MEANING OF LIFE, EARTH FROM SPACE) (MP)

**WORLD VILLAGE:** See ETHICS, POVERTY.

**WORLD WIDE WEB:** Created by CERN mathematician Tim Berners-Lee and publicly released in 1992, the World Wide Web (or 'Web', denoted in internet addresses by 'www.') is mediated. (See INTERNET, WEB ADDRESS, WEB BROWSER) (MP)

**WORM :** 1. Self-propagating computer program or software fragment, usually with potential for illicit damage to data and normal operations. In metaphor with biological parasitic worms, use of the term dates from the rebel 'tapeworm' program of John Brunner's 1975 science fiction novel *The Shockwave Rider*. A worm differs from a computer virus in its autonomous ability to tunnel segments of its programming across networked computers without having to latch onto a program or data file. (See COMPUTER VIRUS) 2. Generalized term for elongate invertebrates such as annelids and parasitic worms like nematodes. (See ANNELIDA, WORMS) (MP)

**WORMHOLE :** 'Wormhole', a term coined by John Wheeler based on the 'Einstein-Rosen bridge', describes a point in spacetime geometry which is stretched or pinched (for example inside small black holes), and postulated to form a quantum topological 'tunnel' connecting to other regions of spacetime. Wormholes have some of their most interesting applications in theoretical physics which investigates the possibilities of interstellar and time travel. Wormholes are speculated to perhaps be a cosmic 'umbilical cord' from which new mini-universes may be born, or a type of bridge or gateway connecting distant universes and/or different regions of our universe. (See BLACK HOLE, SINGULARITY, EVENT HORIZON, PARALLEL UNIVERSE THEORY) (MP)

**WORMS :** Infection by parasitic worms, organisms which complete part of their life-cycle in the intestine, liver or bloodstream of a host body. Intestinal worms and other health implications associated with unclean water are common across much of the less-developed world. Examples of parasitic worms include nematodes, tapeworms, hookworms, roundworms, pinworms, flatworms and flukes. (See WORM, PARASITE)

(MP)

**WRIGHT, ROBERT** . Author. *The Moral Animal. Why We Are The Way We Are. The New Science of Evolutionary Psychology* (New York: Vintage Books, 1994). (DM)

**WRONGFUL LIFE** : In civil law, a cause of action which alleges that a defendant has wrongfully caused a child to be born. (DM)

**WTO**: WORLD TRADE ORGANIZATION.

**WWF**: Worldwide Fund for Nature (formerly World Wildlife Fund).

# X

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<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**X- FACTOR**: Heme required for the growth of certain Haemophilus Spp. (JA)

**X-LINKED**: Genes carried on the X chromosome.

**X-LINKED RECESSIVE DISORDERS**: Those disorders due to a mutation on the X chromosome. X-linked recessive disorders usually only affect males, but the disorders can be transmitted through healthy female carriers. Examples are haemophilia, Duchenne muscular dystrophy and the Fragile X syndrome which is associated with learning disability. (JA)

**XENOBIOTIC** : (Greek *xenos* "foreign" + *bios* "life") pertaining to drugs or organic poisons that are foreign to the body; such as drugs of abuse, organophosphorus pesticides, certain anticancer drugs, cytotoxic agents and aromatic hydrocarbon components of cigarette smoke. (See smoking, passive smoking). (IP)

**XENOETHICS** 1. foreign ethics such as the ethical beliefs of other cultures 2. standards of conduct and moral judgment based on cultural and/or religious confines. (See ETHICS). (IP)

**XENOGRAFT** : (Greek *xenos* "foreign" + *graphion* "stylus") also called heterograft, a temporary graft of tissue from a foreign species used in emergency situations, as in the treatment of severe burns, when insufficient healthy tissue from the patient is available. The graft is quickly rejected by the body's immune system but provides protection of open wounds for a few days. (See AUTOGRAFT, ALLOGRAFT). (IP)

**XENOPHOBIA** : (Greek *xenos* "foreign" + *phobos* "fear") an irrational fear of strangers, especially foreigners, or an unfounded anxiety in unfamiliar environments. The condition may be seen as a type of anxiety disorder. (See RACISM). (IP)

**XENOTRANSPLANTATION** : involves the removal of an organ/s, tissue/s or cell/s from one animal species donor organism and transplanted to a human being. Xeno = other than /different. One animal to a different animals transpecies implantation (JA+IP)

**XYLEM**: Vascular tissue of angiosperm plants, involved in the transport of water with its dissolved minerals and nutrients. (See PHLOEM, ANGIOSPERM, PLANTAE) (MP)

**XXX KARYOTYPE** : An abnormal chromosomal arrangement in males which is characterized by an extra Y chromosome. (DM)

## Y

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**YELLOWCAKE**: Unprocessed uranium oxide, or mined uranium ore. (See URANIUM) (MP)

**YI CHEMA** : (1836-1900) Korean physician. Developed the Korean Sasang (4-type) medical system. As in Greek medicine, the Sasang system divides people into four types, and the treatment of conditions is based upon one's constitutional type. However, the definition of these four types is different than the humors of Greek medicine. Yi Chema wrote a detailed description of his system in the work "Tongui suse powon" (Longevity and Life Preservation in Oriental Medicine). (AG)

**YIELD**: 1. To surrender or relinquish power. 2. Interest payment or profit returns. 3. The produce returned from agricultural cultivation, hunting or fishing. (See SUSTAINABLE YIELD, OPTIMUM SUSTAINABLE YIELD) (MP)

**YIN AND YANG**: The two forces in the universe in traditional Chinese terms, which are both in opposition and complementary to each other. Yin and Yang represent the positive and negative forces in the universe, and these can be perceived in every aspect of the universe. Although they may be labelled as "positive" and "negative", one is not preferred over the other. Rather it is more along the lines of positive and negative existing in electrical currents. Both are integral aspects of electricity. As with the five elements (see Five Elements), Yin and Yang should

ideally be in balance. If an imbalance develops in either direction, this can generate problems of various types. The concepts of Yin and Yang are important for traditional Chinese medicine. (AG)

**YONI:** From Sanskrit, the yoni refers to the vulva or feminine gender, sometimes represented in image or statue and worshipped in Hinduism as a divine object of pleasure and regeneration. (See LINGAM). (MP)

**YOUTH:** Young people, individually or collectively, and the freshness, vigor, enthusiasm and flexibility associated with youth. Human mythologies have always yearned for an eternal 'fountain of youth', and people have the senior adulthood, INTERGENERATIONAL EQUITY) (MP)

**YUK FACTOR :** A term used to indicate the ethical acceptability of any type of experimental engineering procedures. For example can a cow be used as a "milk producing machine" due to genetically engineering from the conception to zygote to embryo to fetus when exactly one can recognize human personhood? (JA)

**YUPPIES:** Colloquial contraction of 'Young Upwardly-mobile (or Urban) Professionals', the yuppie contrasts with the hippie in the social trends. Yuppiedom is the associated MP)

## Z

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<a href="#">TOP</a>									<a href="#">UPDATES</a>									<a href="#">EUBIOS</a>							

**ZERO GRAVITY:** An environment with an absence of gravitational force, such as that of the orbiting Space Shuttle or the newly developed International Space Station. Has relevance to some experimental research in physiology and to health factors such as muscle mass and bone density after extended human exposure. (See INTERNATIONAL SPACE STATION, NASA). (MP)

**ZERO POPULATION GROWTH :** a situation of equilibrium in which there is no population increase during a given year, or other defined period of time, because the total live birth rate (+ immigration) is equal to the total death rate (+ emigration). The environmental impact of population growth rate can better be appreciated by the time taken for the population to double in size. For example, growth rates of 2% - a

doubling time of 35 years - is particularly relevant since large parts of the world have a growth rate close to 2% which is clearly unsustainable. (See EXTINCTION, POPULATION, HUMAN EXTINCTION, CRITICALLY ENDANGERED). (IP+MP)

**ZOHAR:** ("Splendour") Main text of the Jewish mystical teachings of the Kabbalah. It contains commentary on the Pentateuch, said to have been communicated to Moses at Mount Sinai. Discovered in the 13th Century, it was perhaps arguably composed by Moses de Leon of Guadalajara, but was attributed to Rabbi Shimon bar Yochai (2nd Century) and is considered authentic by followers of the Kabbalistic tradition. (See KABBALAH) (MP)

**ZONA PELLUCIDA:** A thick, transparent noncellular layer of uniform thickness surrounding the oocyte, zygote and early embryo for several days, when it degenerates and allows the embryo to everge or hatch out.

**ZOO:** (Greek: *zoion* "animal") 1. Zoo- and zo- are the combining forms indicating animals. 2. Zoo is an abbreviation of zoological garden, a place where animals are kept for exhibition to the public. Zoos also play an important conservation role, including breeding programs for endangered species, biological science and research, and promoting environmental education and ecological empathy. (MP)

**ZOOGEOGRAPHY:** Study of the geographical range and distribution of animals across the earth. Of particular importance is the monitoring of endangered species and the spread of exotic pests. (MP)

**ZOOLOGY:** (Greek: *zoion* "animal" + *logos* "word" or "reason") The branch of biological science dealing with animal life, for example the classification, evolution or physiology of animals, or the characteristics or diversity of fauna in a group or region. (MP)

**ZOONOSES :** Diseases which are specific to animals in the normal course of life and are contracted by human beings due to/after xenotransplantation (JA)

**ZOROASTER :** (Zarathustra- meaning "owner of the golden camel") (lived between approx. 1400- 1200 bce). Founder of Zoroastrianism (see Zoroastrianism). Central topics in his teaching include cattle herding, pursuit of justice, kinship and friendship, hospitality, and priestly rituals. Nietzsche's (see Nietzsche) book "Also sprach Zarathustra" (Thus spoke Zarathustra) makes use of Zoroaster's name as an ancient prophet, although the book is not about Zoroastrian teachings. (AG)

**ZOROASTRIANISM :** The teaching of Zoroaster. According to this teaching, the world and all good things in it were created by Ahura Mazda. Ahura Mazda was aided in the creation by six lesser divinities known as the Amesha Spenta (Holy Immortals). Ahura Mazda, along with these six Amesha Spenta make up the Zoroastrian Heptad (Greek "heptad", meaning "group of seven"). The Heptad and dualism provide the foundation for Zoroastrian teachings. (AG)

**ZPG :** See ZERO POPULATION GROWTH

**ZHU XI:** See CHU HSI.

**ZYGON:** Greek word meaning "yolk" hence is the key concept describing zygote. Also the name is taken by a journal of science and religion. (IP)

**ZYGOTE:** The fertilized egg; the single cell that is formed when the two haploid sets of chromosomes in the pronuclei of the male and female gametes come together at syngamy. Also used loosely to refer to the early embryo during the first few weeks. The single cell resulting from the syngamy of nuclei from sperm and egg after fertilization (DM, JA)



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